MBTA Commuter Rail Fare Study

March 2020

Prepared by the MassDOT Office of Performance Management and Innovation

Authors and Acknowledgments

The following people made valuable contributions to this study and report:

Rob DiAdamo	*Executive Director of Commuter Rail, MBTA Railroad Operations*
Amanda Escaba	*Graphic Design and Data Visualization Assistant, OPMI*
Anna Gartsman	*Manager of Data Analytics, OPMI*
Scott Hamwey	*Director of Bus Modernization, MBTA Office of the Chief Engineer*
Eric Jewel	*Performance Management and Evaluation Assistant, OPMI*
Kate Kryder	*Graphic Design and Data Visualization Assistant, OPMI*
Alexandra Markiewicz	*Transportation Planner, MassDOT Office of Transportation Planning*
Mike Muller	*Assistant General Manager for Strategic Initiatives, MBTA*
Laurel Paget-Seekins	*Assistant General Manager for Policy, MBTA*
Jen Elise Prescott	*Deputy Director of Research and Analysis, OPMI*
Christof Rindlisbacher	*Spatial Analysis Assistant, OPMI*
Evan Rowe	*Dir. of Commercial Strategy, MBTA Comm. Strategies and Programs*
Anna Sangree	*Spatial Analysis Assistant, OPMI*
Gregory Sobczynski	*Director of Title VI and Accessibility, MassDOT Office of Civil Rights*
Andy Stuntz	*Senior Manager of Fare Policy Analysis, MBTA Fare Transformation*
Ian Thistle	*Manager of Performance Data and Technology, OPMI*
Anthony Thomas	*Manager of Policy Development and Outreach, MBTA Policy*
Alissa Zimmer	*Spatial Analyst, OPMI*

Contents

This page was left intentionally blank

Executive Summary

At the direction of the Massachusetts Legislature, the Massachusetts Department of Transportation (MassDOT) has completed a study of MBTA Commuter Rail fares. In this report we provide our analysis and findings and recommend changes to address several potential issues with current fares.

Our analysis and recommendations take as first principles that MBTA Commuter Rail fares should be *rational* and *equitable*.

> ***Fares should be rational***, based in a sensible way on identifiable policy principles. The MBTA has a statement of fare policy that was approved by its Fiscal and Management Control Board in December 2015 and identifies three high-level objectives for fare policy:
>
> 1. Increase revenue
> 2. Improve service and customer experience
> 3. Advance social, equity, environmental, and regional economic goals
>
> These objectives are the starting point for this study of Commuter Rail fares.
>
> ***Fares should be equitable***. At a minimum, MBTA fares should comport with Federal guidance and regulations on transit equity based on Title VI of the Civil Rights Act of 1964. One key Title VI requirement is that the MBTA study any potential fare changes to identify and mitigate disparate impacts on minority populations and disproportionate burdens on low-income populations – changes that would favor upper-income or non-minority groups over low-income and minority populations.

Rationality and equity both require that the MBTA ***consider fares holistically*** – not setting Commuter Rail fares in isolation, but with reference to all of the MBTA's other services, fares, and riders.

The following sections provide an overview of current Commuter Rail fare policy, a summary of our findings, our recommendations for Commuter Rail fares, and future considerations following this study.

Current Commuter Rail Fares

MBTA Commuter Rail currently provides roughly 130,000 trips on an average weekday. The fare for each of these trips depends on the zones where the trip started and ended, eligibility for reduced fares, and which fare product is used.

There are currently 11 fare zones, with each Commuter Rail station assigned to a zone based on its distance from downtown Boston. The central zone, Zone 1A, plays a particularly important role, determining whether a trip is priced as a Zone 1A trip (entirely inside Zone 1A), a Zone trip (entering or leaving Zone 1A), or an Interzone trip (entirely outside Zone 1A). For different Zone and Interzone trips, the fare depends on the number of zones that are crossed.

The MBTA provides both single-ride ticket and monthly pass options for paying Commuter Rail fares. Each ticket and pass is valid for specific types of Commuter Rail trips, and passes are also valid to varying degrees on other MBTA services (like bus and subway). Certain riders – including students, seniors, and people with disabilities – can qualify for reduced fares on single-ride tickets (at half the full-fare price).

Findings

This section summarizes findings that emerged from the analysis in this study. There are four key findings, each with several supportive findings.

Key Finding: Current Commuter Rail fares are generally consistent with identifiable policy principles.

Supportive Findings:

- There are many potential policy principles for setting fares. MBTA Commuter Rail fares are primarily organized around principles of trip distance and competitiveness (also accounting in some ways for principles of operating cost, quality of service, and access and affordability).
- MBTA's zone-based fares and assignment of stations to zones are generally consistent with track distance from stations to downtown terminals.
- For travel from Commuter Rail stations to the downtown terminals, Commuter Rail is generally competitive with driving and parking in downtown Boston. The competitiveness of Commuter Rail with driving for any *particular* trip depends on many case-specific factors.

Key Finding: The rationality and equity of Commuter Rail fares can be improved.

Supportive Findings:

- Fares may be unaffordable for low-income populations throughout the system who do not have access to existing reduced fare programs.
- A large gap has developed between the Zone 1A fare and the Zone 1 fare.
- Round trips that enter or leave Zone 1A but have low parking costs or other transit options are priced too high to compete effectively with lower-cost alternatives.

Key Finding: Lowering fares for Zone 1-10 trips or moving stations into Zone 1A creates equity problems and other unintended consequences.

Supportive Findings:

- Low-income populations are located throughout the Commuter Rail service area, so lowering fares at *select stations* cannot improve affordability system-wide.
- Lowering Zone 1-10 fares or moving stations into Zone 1A *in isolation* would benefit upper-income and white riders out of proportion with overall MBTA demographics, requiring the MBTA to seek alternatives and potentially mitigation (such as offsetting fare reductions on other modes).
- Moving stations into Zone 1A for reasons other than distance to downtown Boston creates many unintended consequences.

Key Finding: Lowering fares in targeted and moderated ways has the potential to address issues without some of these consequences.

Supportive Findings:

- People-based policies to improve access and affordability would be more effective than place-based policies like lowering fares and changing station zones.
- Smoothing the fare jump from Zone 1A to Zone 1 would counteract the growing difference in fares for adjacent stations while maintaining the principle of trip distance.
- Reducing fares for off-peak and reverse-peak travel would improve competitiveness for these trips, growing ridership on underutilized trains.

Recommendations

Based on the findings above, we make three recommendations for improving the rationality and equity of Commuter Rail fares while maintaining consistency with the current policy principles for fares.

Recommendation: Complete the ongoing feasibility study of means-tested fares.

Low-income riders who do not qualify for existing reduced fare programs may be unable to afford Commuter Rail fares — especially Zone 1-10 fares. While a place-based policy like lowering fares in Zone 1 or moving certain stations into Zone 1A would help low-income populations *in those locales*, it would not improve access for low-income families elsewhere in the Commuter Rail network, it would disproportionately benefit existing upper-income riders and disparately benefit existing white riders, and it would have other unintended consequences. People-based approaches to improving equity, like means-testing, can avoid these pitfalls and more effectively improve access by targeting low-income populations throughout the entire region.

Recommendation: Smooth the current jump between the Zone 1A fare and the Zone 1 fare.

This fare jump has grown much larger since 2007, and the large gap between fares at adjacent stations strains the geographic equity of the fare system and diminishes the consistency of the principle that fares are based on distance. The fare gap could be reduced in several ways, which have different implications for fare revenue and fare equity:

1) *Zone 1 (and Zone 2) fares could be lowered*. On its own, this change would reduce fare revenue, and it would result in a disparate benefit to white riders and a disproportionate benefit to upper-income riders – requiring the MBTA to analyze less discriminatory alternatives and to consider mitigation measures, such as packaging with fare equity improvements. However, if such a change were incorporated into an upcoming fare change, the MBTA would have the opportunity to make fare adjustments across media and modes to address these possible disparities and ultimately improve fare equity system-wide.
2) *Zone 1 fares could be held constant while Zone 1A and Zone 2-10 fares increase*. This is a very gradual approach absent changes to state law limiting the size of fare increases. It would reduce potential revenue gains from a fare change (foregoing increases in the Zone 1 fare), but it is unlikely to create inequities under Title VI in the context of a broader fare change.

Recommendation: Develop a pilot proposal for reverse-commute and off-peak fares.

Lowering fares for these trip types (especially reverse-commute) would be consistent with competitiveness as an organizing principle for Commuter Rail fares, since these trips currently charge Zone fares but must compete with a lower cost of driving and parking.

Reverse-commute and off-peak fares have the potential to grow ridership before future capacity expansions by providing discounts at times and places with significant excess capacity; however, the ridership benefits and revenue impacts are uncertain. A pilot on certain lines, potentially in connection with mitigation for service disruptions or other pilot initiatives, could be used to evaluate the feasibility and impacts before considering adoption across the entire Commuter Rail system.

Future Considerations

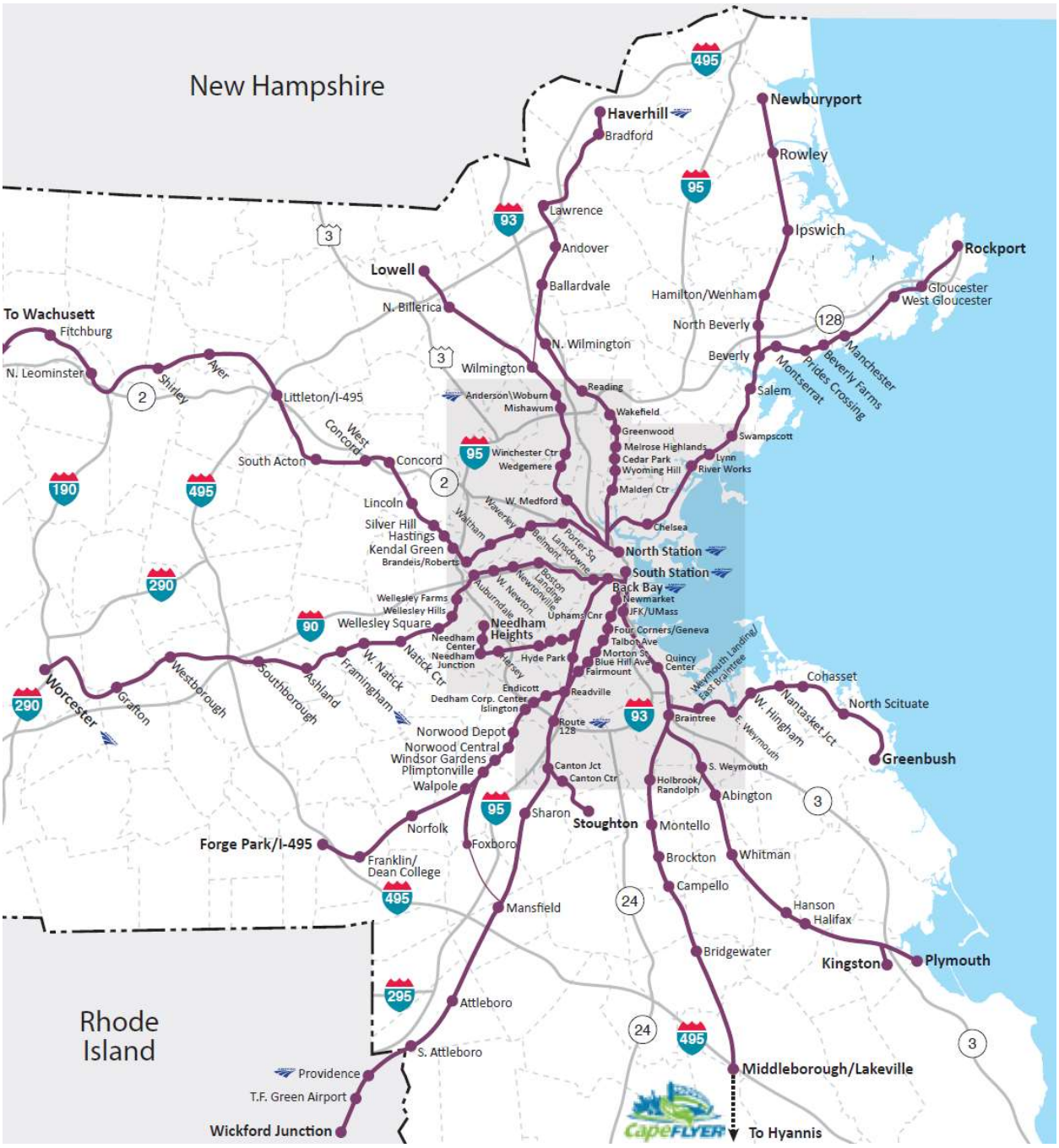
This study identifies the primary policy principles that are reflected by the *current* fare structure and presents several opportunities to make improvements consistent with *current* guiding principles. Our recommendations can be implemented within the next few years, either before or during the next MBTA fare increase. (By resolution of the Fiscal and Management Control Board, the next time the MBTA will consider increasing fares is July 2022.)

Future fare technology and service projects will provide many opportunities for broader conversations about *alternative* policy principles or more significant restructuring of fares:

- As part of the Fare Transformation project, Commuter Rail is expected to integrate with the broader automated fare collection system around 2024.
- The timeframe for pilots or initial phases of implementation related to the Rail Transformation effort (following completion of Rail Vision) is currently in development.

We hope this study provides a foundation to inform those discussions in the coming years.

Introduction and Background



Source: https://cdn.mbta.com/sites/default/files/maps/2019-12-22-mbta-system-map-2020-full.pdf

Introduction

Legislative Mandate

MassDOT has prepared this report at the request of the Massachusetts Legislature (Bill H.4828,[1] Chapter 204 of the Acts of 2018[2]):

> The Massachusetts Department of Transportation shall complete a comprehensive review and study of the current methods utilized to set fare rates on the Massachusetts Bay Transportation Authority commuter rail. The study shall include, but not be limited to, an examination of: (i) the fairness and equity of the current distance based fare system that utilizes fare zones; (ii) pricing based on track distance from the terminal station; (iii) the impacts of commuter rail fare price on passengers' transportation choices, considering frequency of service, travel time and parking costs, between commuter rail, motor vehicle transportation, public bus and subway service; (iv) the potential for lower interzone fares to encourage ridership outside core central stations; (v) the potential for discounted fares for riders in gateway cities or similarly situated municipalities; and (vi) the potential for utilizing a variable pricing system based on the time of day; and (vii) the impact on any of these changes on fare revenue.
>
> To complete the study, the department shall utilize, to the extent possible, updated passenger counts at all commuter rail stations for the most recent calendar year, including data collected using an automated passenger count system from all commuter rail cars. The Massachusetts Bay Transportation Authority shall use the outcome of the study and the data collection to inform fare policy decisions. The department shall submit a written report of its findings, including recommendations, with the clerks of the senate and the house of representatives, the senate and house committees on ways and means and the joint committee on transportation not later than March 15, 2020.

As requested by the Legislature, this report examines Commuter Rail pricing, fare equity, choices between modes, and the potential for lower fares. The report provides illustrative estimates of fare revenue impacts for the recommended changes to Commuter Rail fares. Any broader changes to the Commuter Rail fare structure that may be considered in the future would require additional analysis of fare revenue and other impacts.

MBTA Policy Goals

This report discusses Commuter Rail fares within the context of the larger MBTA network and policy goals. To guide fare-related decision-making, the MBTA's Fiscal and Management

[1] https://malegislature.gov/Bills/190/H4828
[2] https://malegislature.gov/Laws/SessionLaws/Acts/2018/Chapter204

Control Board adopted a statement of fare policy in December 2015 that identifies three main fare policy objectives: raise revenue; improve service and customer experience; and advance social, equity, environmental, and regional economic goals.[3] These objectives reflect the complexity of developing a fare structure that meets the needs of the MBTA and its users; addresses the larger social goals for public transport; and fulfils federal civil rights obligations.

Raise revenue

Since fare revenue is a critical component of the MBTA's operating budget, any increase to, or restructuring of, fares should ensure that the total fare revenue stream is maintained at an appropriate level to meet the MBTA's farebox recovery goals.[4]

Improve service and customer experience

When an increase in ridership creates crowding and the need to add service, the resulting additional fare revenue is offset by new operating costs or reductions in comfort (and wait times for overcapacity vehicles). It is therefore important to prioritize fare strategies that will increase ridership on services that have underutilized passenger capacity.

Advance social, equity, environmental, and regional economic goals

The fare structure should not significantly limit the ability of riders to access the MBTA system and move through it with ease. To be equitable, fare levels and the fare structure must take into account the different types of services and needs of various populations of users. The MBTA follows all Federal Title VI and Environmental Justice compliance requirements to ensure that for any fare increase, the impacts on minority and low-income populations are effectively analyzed and possible disparities and/or disproportionalities are properly addressed. The threshold is set by the MBTA policy on Disparate Impact and Disproportionate Burden.[5]

Report Objectives and Organization

This report has three primary objectives:

1. to identify the **current policy principles** behind MBTA Commuter Rail fares (i.e. why are Commuter Rail fares structured the way they are?),
2. to develop recommendations in response to several **near-term problems and opportunities** in Commuter Rail fare policy, and
3. to **identify other potential policy principles** that could be applied to future changes in Commuter Rail service.

[3] https://www.mbta.com/farepolicy2015
[4] Section 6A of the 2013 Session Law Chapter 46
[5] https://www.mbta.com/policies/fair-service-fair-fares

This first section, Introduction and Background, provides background on MBTA Commuter Rail service and fares.

In the second section, Principles and Priorities, we describe a range of *potential* organizing principles for Commuter Rail fares and identify the ones that drive the *current* Commuter Rail fare structure.

Within the framework of these current principles for Commuter Rail fare policy, the third section, Policy Analysis, develops recommendations for three particular issues and opportunities that have come to the fore of public discussion: how to improve the social equity of Commuter Rail fares, how to address the growing gap between Zone 1A and Zone 1 fares, and how to make use of excess capacity on reverse-peak and off-peak trains.

The Recommendations section reviews proposals for near-term improvements to fares that are consistent with current fare policy principles. We conclude with considerations for longer-term discussion of Commuter Rail fares.

Background on MBTA Commuter Rail

This section provides a basic overview of MBTA Commuter Rail – current and planned service, fares and products, parking, and fare collection.

Commuter Rail Service

Current Service

Despite representing fewer than 10% of MBTA trips, the Commuter Rail is responsible for nearly 35% of fare revenues, 25% of the system's operating budget, and 40% of total passenger miles. The MBTA's Commuter Rail service is operated through a contract with Keolis Commuter Services, which is responsible for staffing, maintaining on-time performance, station and train cleanliness, and performing routine inspections and maintenance.

Commuter Rail Shares of Expenses, Fare Revenues, and Passenger Travel (Fiscal Year 2018)

Mode	Operating Expenses (%)	Fare Revenues (%)	Passenger Miles (%)	Passenger Trips (%)
Commuter Rail	**24.9**	**34.7**	**39.6**	**8.8**
Bus	29.8	14.9	15.8	28.3
Rapid Transit	36.8	47.8	43.0	62.0
Ferry	0.9	1.7	0.7	0.4
Paratransit	7.6	0.9	0.9	0.5
Total	100.0	100.0	100.0	100.0

Source: National Transit Database 2018 (https://www.transit.dot.gov/ntd/transit-agency-profiles/massachusetts-bay-transportation-authority)

The MBTA currently operates Commuter Rail service on 14 lines – 9 lines serving South Station and 5 serving North Station. Service levels vary by line and service tends to be more frequent on trunk sections where multiple lines come together. Most lines operate a mix of local and express or zonal express service, meaning not every train stops are every station, but may only serve a portion of the line to reduce travel time. In general, trains run on average every 30 minutes during peak hours and every 75 minutes in the off-peak periods. The service is not symmetrical, meaning service into Boston is more frequent in the morning peak period and outbound service in more frequent in the evening peak period across all the lines, as the system is geared toward providing commuter service to connect outer parts of the region with downtown Boston.

Commuter Rail ridership is collected each day by conductors who manually count the number of passengers who board the train. These numbers, however, are often unreliable. In 2012 and 2018, the Central Transportation Planning Staff of the Boston Region Metropolitan Planning Organization (CTPS) conducted a detailed counting of all boardings

and alightings at each stop for each train on each line. The MBTA believes these results, seen below, are the most accurate available measure of current Commuter Rail ridership. The MBTA is in the process of installing automatic passenger counters (APCs) across the entire Commuter Rail fleet. While APC data was not available for this report, enough APCs have recently been installed to begin data collection and validation. APC data will provide better estimates of ridership on a continuous basis in the future, allowing for improvements in ridership reporting and analysis (such as pilot evaluations).

Average Weekday Ridership by Commuter Rail Line, 2012 and 2018 Counts

Southside Ridership				
Line	2012	2018	Growth	% Growth
Providence/Stoughton	21,497	25,728	4,231	19.7%
Worcester	12,787	18,636	5,849	45.7%
Franklin	10,080	11,671	1,591	15.8%
Middleborough/Lakeville	5,006	6,863	1,857	37.1%
Needham	5,814	6,690	876	15.1%
Greenbush	4,353	6,114	1,761	40.5%
Kingston/Plymouth	5,513	6,089	576	10.4%
Fairmount	789	2,652	1,863	236.1%

Northside Ridership				
Line	2012	2018	Growth	% Growth
Newburyport/Rockport	14,003	14,972	969	6.9%
Lowell	9,817	10,925	1,108	11.3%
Fitchburg	7,924	9,302	1,378	17.4%
Haverhill	6,991	7,112	121	1.7%

Total Ridership				
Line	2012	2018	Growth	% Growth
Southside	65,839	84,443	18,604	28.3%
Northside	38,735	42,311	3,576	9.2%
Full System	104,574	126,754	22,180	21.2%

Sources and Notes: CTPS Commuter Rail Counts, 2012 and 2018 (https://www.ctps.org/commuter_rail_counts, https://cdn.mbta.com/sites/default/files/fmcb-meeting-docs/2019/01-january/2019-01-28-fmcb-commuter-rail-ridership-original.pdf)

Future Service

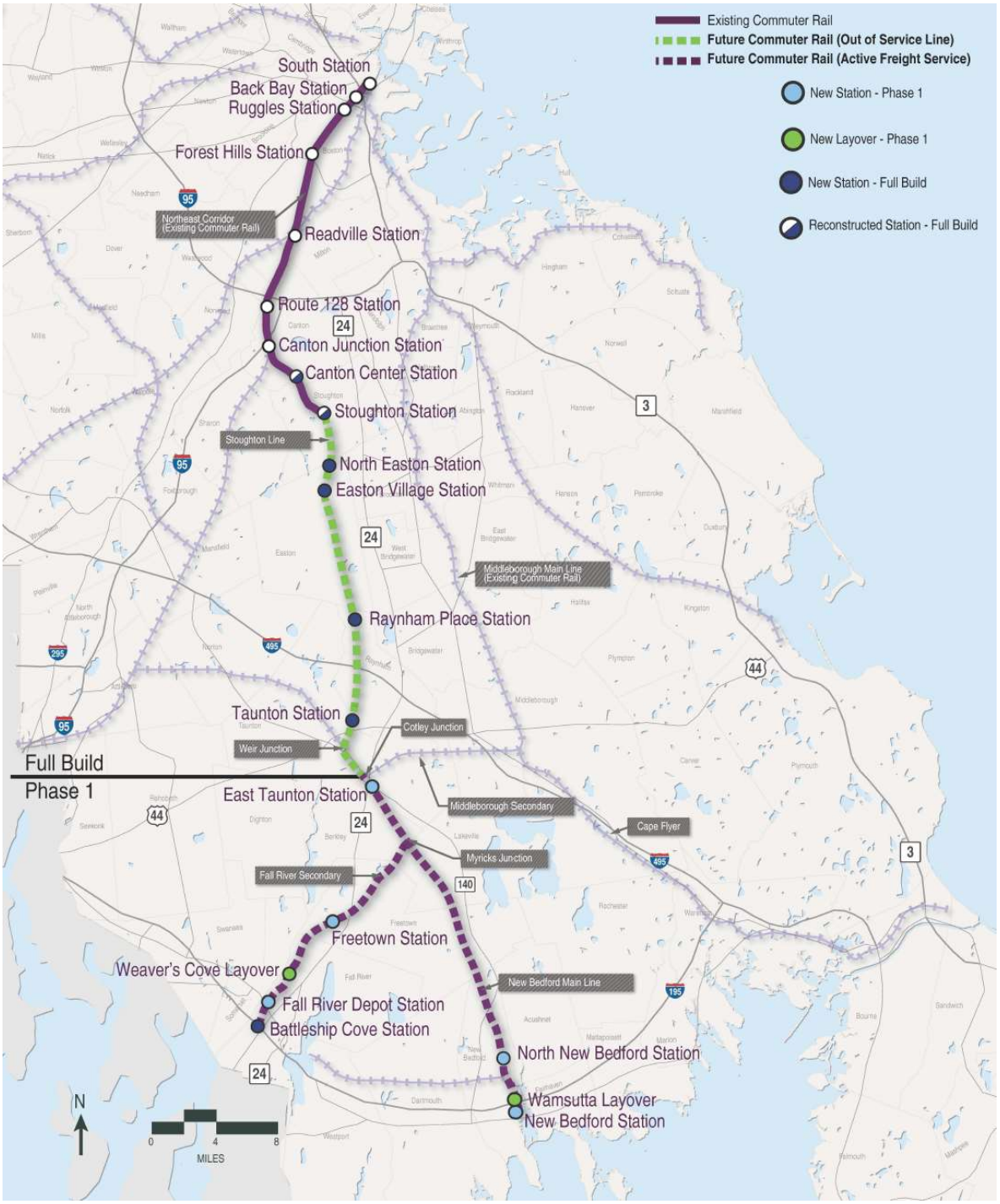
Several ongoing planning and expansion projects are shaping the future direction of MBTA Commuter Rail service.

South Coast Rail

The South Coast Rail project will provide a reliable Commuter Rail connection between Boston and southeastern Massachusetts, providing riders in the New Bedford, Fall River, and Taunton communities with a one seat trip to Boston by extending existing Commuter Rail lines. Phase One of the project is expected to be completed by Fall 2023 and involves extending the Middleborough/Lakeville Line to create the Fall River and New Bedford lines.

The Full Build of the project is predicted to be completed as early as 2030 and involves creating the Stoughton Straight Electric Alternative by extending the Stoughton branch to connect with the new Fall River and New Bedford lines. This work involves reconstructing and upgrading existing tracks and stations and building several new stations.

South Coast Rail, Full Build



Source: MBTA (https://www.mbta.com/projects/south-coast-rail)

Rail Vision Phase 1

The Rail Vision project is identifying strategies to leverage the MBTA's Commuter Rail network to better meet the transportation and economic growth needs of the Greater Boston region. In November 2019, the Fiscal Management and Control Board discussed the results of the Rail Vision analysis and endorsed moving towards a higher frequency (every 15- to 20-minutes on dense corridors and elsewhere as appropriate), electrified system with investments in high-level boarding platforms and parking coordinated with other MBTA programs. The program to implement this type of service is referred to in this report as the Rail Transformation effort. The Board proposed an initial set of investments, which included electrification and 15-minute service frequencies through Lynn on the Newburyport/Rockport lines and on the Fairmount line and providing electrified service through Providence on the Providence Line. Currently, MBTA staff is developing a more detailed proposal for an initial phase of service changes, investment needs, and vehicle procurement. The Phase 1 proposal builds on the Board's direction and the results of Rail Vision, identifying needs for the lines identified and additional frequency and service changes for other lines. The Board's plan has not been modelled yet; related modelling scenarios resulted in a ridership increase of 19,000-81,000 daily Commuter Rail boardings by 2040 assuming current fares, with additional ridership expected if Commuter Rail fares were lowered for travel within the central urban region.

Systemwide Access Study

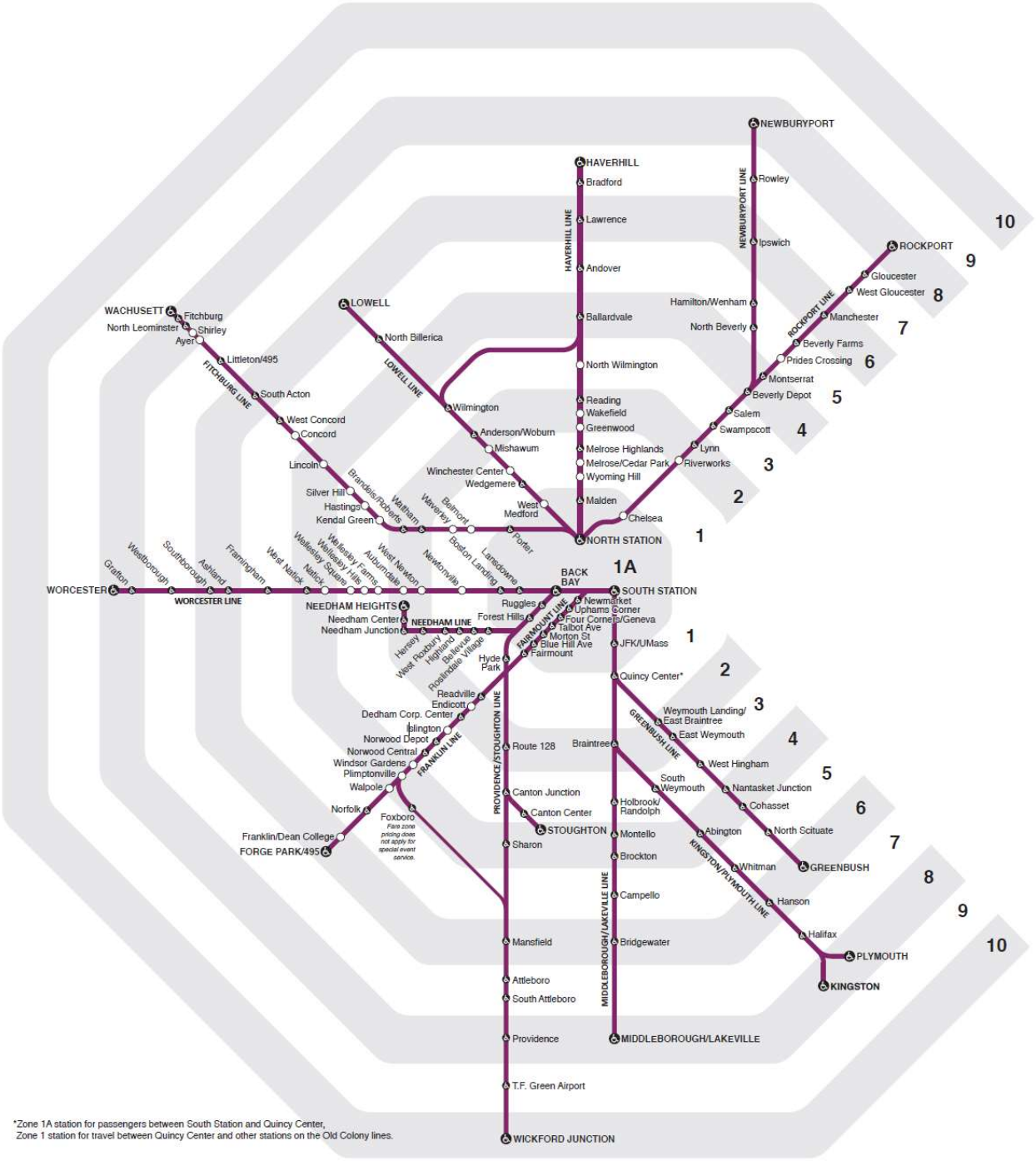
Currently, a major constraint on Commuter Rail ridership is access to parking at or near stations. Parking lots, to varying degrees across the 14 lines, fill up early within the morning peak period, leaving potential riders who access the stations by car to drive to another station or drive all the way to their destination. At some stations, poor biking and walking networks in the surrounding area drive up the demand for parking as riders are not comfortable accessing the station on foot or by bicycle. The MBTA and MassDOT are undertaking a study to understand latent ridership demand for using the MBTA at Commuter Rail and rapid transit stations and identify strategies and priorities for expanding access to the system. The effort will identify current gaps in both parking needs and transit, bicycle, and pedestrian networks surrounding stations to hone in on priority areas for investment and/or municipal coordination to improve access. The effort will result in a cohesive parking and access strategy and set of policies to guide this future multi-modal investment.

Current Commuter Rail Fares

Currently, the fare for a trip on MBTA Commuter Rail is based on the zones where the trip started and ended, eligibility for reduced fares, and which fare product is used.

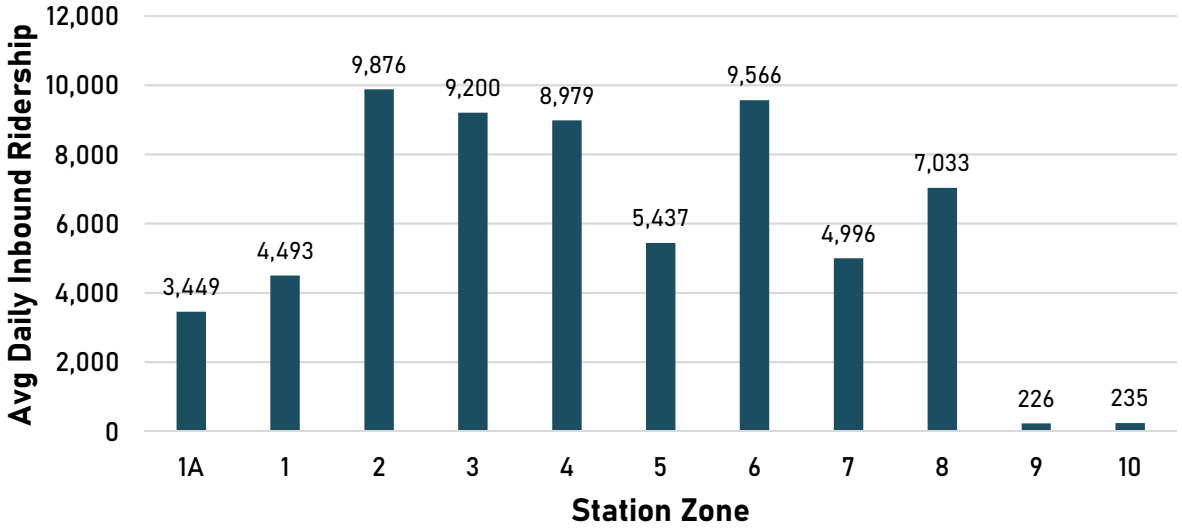
The Commuter Rail system is divided into 11 zones: Zone 1A and Zones 1 through 10. Stations closest to the downtown terminals (North Station and South Station) are in Zone 1A, and other stops are zoned based on their distance from Boston. Only the Providence line has stops in Zones 9 and 10: T.F. Green Airport (Zone 9) and Wickford Junction (Zone 10). Currently, stations in Zones 2 through 8 account for about 87% of total inbound boardings. For many Zone 1A and Zone 1 stations (and some stations in farther zones), MBTA bus and subway provide alternative transit options for travel to downtown Boston.

Commuter Rail Zone Map



Source: MBTA (https://cdn.mbta.com/sites/default/files/maps/2019-09-18-commuter-rail-fare-zones.pdf)

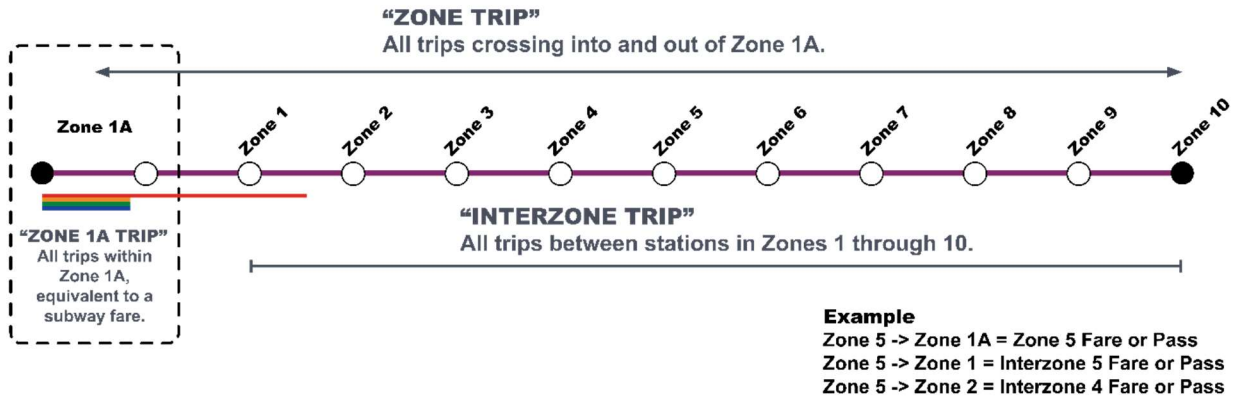
Average Daily Inbound Ridership (2018 Counts)



Source: CTPS Commuter Rail Counts, 2018

The fare type of each Commuter Rail trip is determined by how the trip interacts with Zone 1A. Trips that remain *entirely within* Zone 1A are known as "Zone 1A Trips," trips that go *into or out of* Zone 1A are known as "Zone Trips," and trips that are *entirely outside* Zone 1A are known as "Interzone Trips."

Commuter Rail Trip Types

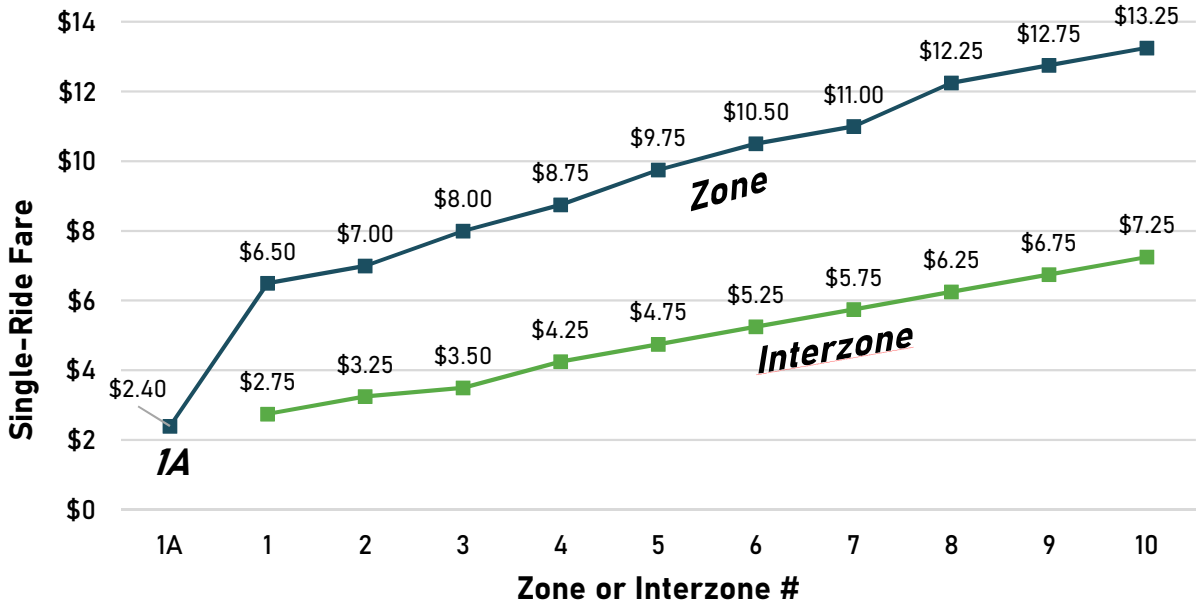


Note: Colored lines reflect the extent of rapid transit lines that share stations with Commuter Rail.

Zone 1A Trips are priced the same as subway fares within the MBTA system. Zone Trips are priced based on the Zone outside of Zone 1A at which they originated or terminated, and Interzone Trips are priced based on the number of zones the trip crosses. For example, if a trip goes from Zone 8 to Zone 1A, it will cost the Zone 8 fare. If a trip goes from Zone 8 to Zone 5, it will cost the Interzone 4 fare (crosses zones 8, 7, 6, and 5).

Zone and Interzone Trip fares are roughly equivalent to a flat fee plus a charge for each additional zone that is crossed. Zone Trips have a flat fee of $6.50 and per-zone charges that range from $0.50-$1.25 (averaging $0.75). Interzone Trips have a flat fee of $2.75 and per-zone charges that range from $0.25-$0.75 (averaging $0.50), resulting in much lower Interzone Trip fares than Zone Trip fares.

Single-Ride Commuter Rail Fares by Trip Type



Source: MBTA (https://www.mbta.com/fares/commuter-rail-fares/zones, https://www.mbta.com/tariff)

Commuter Rail fare products offered by the MBTA include single-ride tickets and monthly passes for both Zone Trips and Interzone Trips. Single-ride tickets afford the ticketholder a one-way ride on the Commuter Rail and are only valid for the specific Zone or Interzone Trip purchased. Single-ride tickets also do not allow for transfers to other MBTA services. Monthly passes allow the pass holder to take unlimited rides on the Commuter Rail for the month it was purchased and are valid up to the designated pass Zone or Interzone. Zone monthly passes allow for transfers to all lower-priced MBTA services, but Interzone passes only allow for transfers to local bus. In addition, the MBTA offers a Weekend Pass (currently $10), which allows riders to take unlimited Commuter Rail rides over the course of a single weekend, regardless of zone. However, this pass does not allow for transfers to other MBTA services.

Several other factors can affect the price for these Commuter Rail products or the type of product needed for a trip:

- *Reduced fares*: Certain riders can qualify for reduced fare discounts on single-ride tickets. This includes people with disabilities, Medicare cardholders, people 65 and older, and middle and high school students.

- *mTicket passes*: Commuter Rail passes purchased on the mTicket mobile app are $10 cheaper than passes purchased on physical tickets or cards, since the mTicket passes do not include transfers or travel on other MBTA modes.
- *Extension fares*: When a rider takes a longer trip than would be allowed by their ticket or pass, rather than purchasing a separate ticket for their full trip they can instead pay a lower "extension fare" based on the additional zones traveled beyond their ticket or pass. For example, if a rider has a Zone 3 Pass and travels from South Station (Zone 1A) to Framingham (Zone 5), they will be charged an extension fare equal to an Interzone 2 fare, as they travelled through two zones beyond the validity of their pass.

Commuter Rail Fare Products

Product	Current Price	Validity on Commuter Rail	Validity for Transfers and Travel on Other MBTA Services
Zone 1A-10 Pass	$90-$426	All lower Zone trips	All lower priced services (Subway, Local Bus, Express Bus, Inner Harbor Ferry)
Zone 1A-10 Single-Ride Ticket	$2.40-$13.25	Zone trips only	None
Interzone 1-10 Pass	$90-$257	All lower Interzone trips	Local Bus
Interzone 1-10 Single-Ride Ticket	$2.75-$7.25	Interzone trips only	None
Weekend Pass	$10	All trips for one weekend (on Saturday and Sunday)	None

Source: MBTA (https://www.mbta.com/fares/commuter-rail-fares, https://www.mbta.com/tariff)

Commuter Rail Parking

The Commuter Rail serves a mix of walk-up and park-and-ride users. For those riders who choose to drive, parking can be a large share of the total cost of using the Commuter Rail. The MBTA owns and operates 100 parking facilities across its transportation network, with more than 44,000 spaces available; cities, towns, and RTAs own and operate an additional 10,000 spaces at MBTA Commuter Rail stations. Parking is available at many, but not all, stations.

Riders who park in MBTA parking facilities have the option of either paying per day or per month. Daily parking rates depend on the location of the parking facility, the day of the week, and the length of the stay, but range from $2-$15. Parking fees can be paid at pay stations or with reloadable tap cards at select garages, or by using the PayByPhone mobile app at surface lots. If customers do not pay by midnight on the day they parked, they will be mailed an invoice with a $1 surcharge. Monthly passes are available at many MBTA lots and vary by rate from $35 to $157.50. With a monthly permit, customers can park in any MBTA lot that costs the same or less than the lot for which the pass was purchased. Some parking facilities also offer premium spot permits for a monthly fee, which allow permit holders access to a more convenient space.

Commuter Rail Fare Collection Process

Commuter Rail tickets and passes are generally purchased before boarding and are collected or checked visually by conductors during travel. Currently, all Commuter Rail stations and platforms are ungated. Onboard cash purchases of one-way and round-trip tickets is typically also available, but may include an onboard surcharge depending on the location.

Keolis and the MBTA are currently undertaking a project to install fare gates at three downtown terminal stations – North Station, South Station, and Back Bay. The fare gates are expected to reduce fare non-payment by validating fares before riders board outbound trains and by checking for proof of fare payment before riders exit from inbound trains.

As part of the broader Fare Transformation project, over the next several years the MBTA will be designing and implementing new fare collection technology and software to further automate fare collection on Commuter Rail. Tap readers will be installed throughout the Commuter Rail system, enabling riders to use the same fare card, funds, and products to travel on all MBTA services and allowing transfers between Commuter Rail and other modes. The use of tap readers will also provide a rich new source of data on Commuter Rail ridership and travel patterns, which are currently estimated on a limited basis using manual counts.

Policy Principles and Priorities

Policy Principles for MBTA Commuter Rail Fares: In Theory

At a high level, the MBTA's objectives for fare policy include maximizing ridership, revenue, and social equity and environmental benefit. These are desired *outcomes*, and they often compete with each other. Implicitly or explicitly, agencies prioritize between these outcomes and set fare policy to best pursue a mix or balance.

This section identifies policy *principles* or *rationales*, which we use here to describe the *frameworks* that could be used to pursue the MBTA's objectives. The principles we discuss are potential ways to connect the outcomes we are prioritizing with the policies and rules that are put in place. Identifying policy principles is important for ensuring that MBTA sets fares in a manner that is fair and transparent, with a clear basis in policy.

For the MBTA, the following questions are especially pertinent:

1. What policy rationales and frameworks should be used to determine any differences between fares for different Commuter Rail trips?
2. What should the relationship be between Commuter Rail and Rapid Transit fares, especially at Commuter Rail stations that either overlap with Rapid Transit or are within a similar distance to the inner core stations?
3. How will future changes in the Commuter Rail service model and potential associated changes in future fare structure align or clash with the rationales for fare policy? What changes might aid this future transition?

Potential Policy Principles for Commuter Rail Fares

There are a number of different policy rationales or principles that could in theory be used to answer the questions above. Potential policy principles for MBTA Commuter Rail fares arise from operating characteristics of Commuter Rail, differences between different Commuter Rail trips, and the relationship between Commuter Rail fares and the fares of other MBTA services.

Potential Policy Principles for Determining Commuter Rail Fares

The list below describes a range of potential principles.

- **Competitiveness:** Any agency can only charge, at most, what a significant number of passengers will pay. What passengers will pay is determined by station- and trip-specific characteristics of Commuter Rail service (time, cost, first and last mile access, convenience, comfort, etc.) as well as the availability and cost of alternatives.
- **Access and affordability:** The MBTA is a public agency and part of its mission is to provide access to opportunity for people who cannot afford or cannot drive a personal vehicle. The MBTA provides a level of subsidy in order to maintain access and affordability, and, given sufficient resources, could provide a higher subsidy on services based on the role they play in providing access.
- **Simplicity and comprehensibility:** MBTA fares need to be understandable to users, both to ensure that riders can know what they are required to pay, and to reduce any information barriers to new riders using the system. Given the current complexity of the Commuter Rail fare structure, there is tension between simplicity and many other potential policy principles.
- **Quality of service:** Quality – broadly encompassing ease of access, service frequency, travel speed, reliability, comfort, etc. – factors into competitiveness, but quality is also an independent consideration. All else equal, should a service with higher quality have a higher fare? MBTA subway service is generally faster, more reliable, and often more comfortable than bus service, and the MBTA currently charges higher fares for subway trips than for bus-only trips. Where both bus/subway and Commuter Rail are options, Commuter Rail has higher in-vehicle speed and comfort but a lower frequency of service, making the quality comparison less obvious.

- **Operating cost**: The MBTA is mandated to recover a portion of its operating costs through fares. The MBTA Commuter Rail system extends much farther than the subway system, so the difference in operating cost (fuel, labor, vehicle and track maintenance, etc.) between short and long trips is greater on Commuter Rail than on other modes. Consistent with this variation in operating cost, the MBTA and many agencies currently charge higher fares for longer-distance trips on Commuter Rail.
- **Trip distance:** Trip distance correlates closely to both competitiveness and operating cost, and as an organizing principle it is much easier to measure and communicate. The fare level required for Commuter Rail to be competitive generally increases with trip length, since the cost of alternatives (such as driving) also increases with distance. Similarly, the MBTA's operating costs are higher for longer-distance trips.
- **Capacity and operations**: Because of land use and travel patterns, some MBTA services are more crowded while some have available capacity. Fare policy could be set in order to "nudge" passengers with options to use the extra capacity. In some cases Commuter Rail can serve as a substitute for subway service, and the parity between current Zone 1A fares and subway fares provide some redundancy in the event of crowding. Additionally, off-peak trips are usually less crowded than peak ones, and some agencies charge lower prices off-peak to incentivize ridership on under-utilized services.
- **Environmental efficiency:** One frequently-stated goal for public transit is to reduce emissions from transportation, in particular those of personal vehicles. Attracting drivers to transit requires careful attention to competitiveness, but environmental efficiency would also imply a fare structure and parking pricing that minimizes driving to *access* transit. More and longer driving trips are incentivized when a large cost savings can be achieved by driving farther; for example, the differential between subway and Commuter Rail fares encourages some longer driving trips to park at a subway stations and Zone 1A Commuter Rail station that have low parking costs.
- **Housing and economic development:** Access to resources and opportunities is an important ingredient for housing and economic development in the region as a whole and in different localities. Commuter Rail service can provide access to jobs for local residents, access to a labor pool for local businesses, and the ability to support density.
- **Regulation:** The MBTA follows state and federal law and regulation around its fare policy, which undergirds all of the above goals. These regulations limit its ability to change fares and specify particular equity considerations it must address in any change. Massachusetts law allows the MBTA to raise fares by no more than 7% for each fare product at most every two years. All fare changes (increases and decreases) are analyzed under the Federal Transit Administration's guidance for Title VI of the 1964 Civil Rights Act and the Environmental Justice Executive Order. The MBTA has adopted a Disparate Impact and Disproportionate Burden policy that sets the threshold to ensure that benefits and burdens of a fare change are not inequitably distributed. This is an essential consideration for fare changes on

Commuter Rail, which has higher proportions of white and upper-income riders than the MBTA system as a whole; Commuter Rail fare decreases disproportionately benefit these riders.

The Role of Commuter Rail Parking Pricing

This report focuses on Commuter Rail fares, but we note that parking pricing is also an important MBTA policy tool that could be used in concert with fares to advance different priorities.

In particular, parking prices affect both:

1. the overall cost competitiveness of Commuter Rail relative to driving, and
2. station access choices for Commuter Rail riders (such as walking versus driving).

Higher parking prices at Commuter Rail stations could encourage non-driving access, which could align with environmental goals (reducing VMT) and capacity (increasing ridership without the need for additional parking). However, increasing parking prices without lowering fares would worsen the overall cost competitiveness of Commuter Rail in situations where driving is the best or only station access option.

Policy Principles for MBTA Commuter Rail Fares: In Practice

The previous section described *potential* policy rationales for Commuter Rail fares. But which policy rationales actually "explain" *current* MBTA Commuter Rail fares? This section presents several analyses of MBTA Commuter Rail fares to illustrate the principles they reflect – how current fares relate to potential policy rationales.

Fares by Trip Distance

One of the clearest principles behind current Commuter Rail fare policy is that fares vary by trip distance, with stations assigned to zones as an approximate measure of distance. As described in the previous section, distance as a policy principle is closely connected to both operating costs and competitiveness with other modes whose costs increase with distance. This section describes the role of trip distance in zone fares and station zone assignment in more detail.

The definition and application of zones plays a very significant role in determining current Commuter Rail fares:

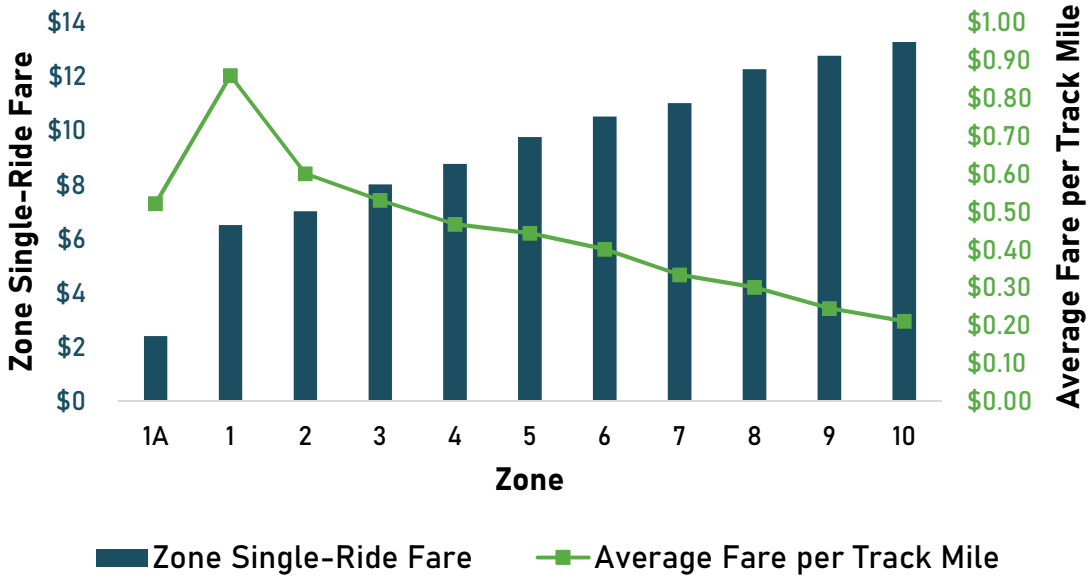
1. Fares increase depending on the number of zones that a trip touches or crosses.
2. Fare type and the number of zones crossed are determined by the assignment of specific stations to different zones.

How do MBTA zones relate to trip distance? If fares were exclusively based on distance *and* zones perfectly reflected trip distance, then the average fare per mile traveled would be the same for every trip. On the other extreme, if the MBTA had a flat fare on Commuter Rail, the fare for a 4½-mile trip from Chelsea to North Station would have a cost per mile 10 times higher than a 44 mile trip from Worcester to South Station. In practice, MBTA fares are not based *exclusively* on distance; beyond Zone 1A, Zone fares effectively have a flat fee of $6.50 and an additional charge averaging $0.75 per zone crossed. The flat fee is spread over additional miles for longer trips, resulting in a decreasing cost per mile. Similarly, Zones 7 through Zone 10 are physically larger (have a larger distance range) than the zones closer to Boston, spreading out the $0.75 per zone crossed and contributing to the decreasing cost per mile. Additionally, zones do not perfectly reflect trip distance, resulting in some additional variation in cost per mile.

How does this fare structure relate to principles of operating cost and competitiveness? A flat fee plus a per-zone charge is actually similar to the structure of Commuter Rail operating cost, which has both a fixed component similar to the flat fee (vehicles, track, operations, administration, etc.) and a variable component similar to the charge per zone crossed (fuel, conductors, etc.). From a competitiveness standpoint, this structure similarly allows Commuter Rail fares to more closely follow the cost of driving as a competing alternative; driving cost also has a fixed component (chiefly parking) and a variable component (fuel, tolls, maintenance, etc.).

Another way that distance relates to competitiveness is *trip purposes*. Different MBTA services serve trips with different purposes; the Commuter Rail system *primarily* serves work trips which tend to be much farther than other trip types. Local, non-work trips are typically served by bus, subway, or other modes. The value placed on speed and reliability is generally higher for work trips than other trips, so speed and reliability will typically be important factors in determining whether Commuter Rail is a competitive option. More to the point of this section, willingness to pay for travel or the value derived from traveling is also generally higher for work trips (which tend to be longer distances) than other types of trips (which are often short distances). This general distinction between longer work trips with higher willingness to pay and shorter non-work trips with lower willingness to pay corresponds to the broad differences in fares across MBTA services: Higher fares for Commuter Rail Zone 1-10 trips and commuter ferry trips, and lower fares for shorter trips inside Zone 1A, on the subway, or on local bus.

Average Fare per Track Mile by Zone



Notes: Average fare per track mile for each zone is calculated as the single-ride Zone fare divided by the ridership-weighted average track distance to the terminal for stations in that zone (using average daily inbound boardings from the CTPS 2018 Commuter Rail counts). North Station and South Station (distance of zero) are excluded from the Zone 1A average.

Distance to Commuter Rail Terminal by Zone

Zone	Average Daily Inbound Ridership (2018)	Range of Track Distances from Station to Terminal (miles)	Range of Straight-Line Distances from Station to Terminal (miles)	Ridership-Weighted Average Track Distance (miles)	Ridership-Weighted Average Straight-Line Distance (miles)	Zone Single-Ride Fare	Average Fare per Track Mile
1A	3,449	1.3 - 7.9	1.1 - 7.5	4.6	4.3	$2.40	$0.52
1	4,493	6.2 - 8.4	5.9 - 7.7	7.6	7.0	$6.50	$0.86
2	9,876	8.4 - 14.8	7.5 - 11.4	11.7	10.3	$7.00	$0.60
3	9,200	12.4 - 16.6	10.3 - 14.9	15.1	13.1	$8.00	$0.53
4	8,979	16.4 - 22.6	12.0 - 20.7	18.8	16.5	$8.75	$0.47
5	5,437	20.0 - 23.4	16.3 - 21.1	22.0	19.3	$9.75	$0.44
6	9,566	24.5 - 30.4	19.8 - 26.7	26.2	23.4	$10.50	$0.40
7	4,996	28.1 - 37.1	24.9 - 34.9	33.0	30.3	$11.00	$0.33
8	7,033	35.0 - 53.5	29.9 - 42.2	40.8	36.3	$12.25	$0.30
9	226	52.1	47.5	52.1	47.5	$12.75	$0.24
10	235	62.8	57.8	62.8	57.8	$13.25	$0.21

Sources and Notes: CTPS Commuter Rail Counts (2018) and MBTA. Zones 9 and 10 each contain a single station.

If MBTA fares were based *purely* on distance, then to maintain current fare revenue the fare per mile would need to be roughly $0.34.[6] The graph below shows how average fares for Zone trips would compare to current fares under a constant cost per mile. Fares for shorter trips would be lowered dramatically, and fares for longer trips would increase dramatically. As described above, fares based purely on distance would *not* reflect the mix of fixed and variable costs to operate Commuter Rail service (or the similar mix of fixed and variable costs for alternative modes that "compete" with Commuter Rail).

[6] FY 2018 Commuter Rail revenue ($229 million) divided by passenger miles (681 million), NTD

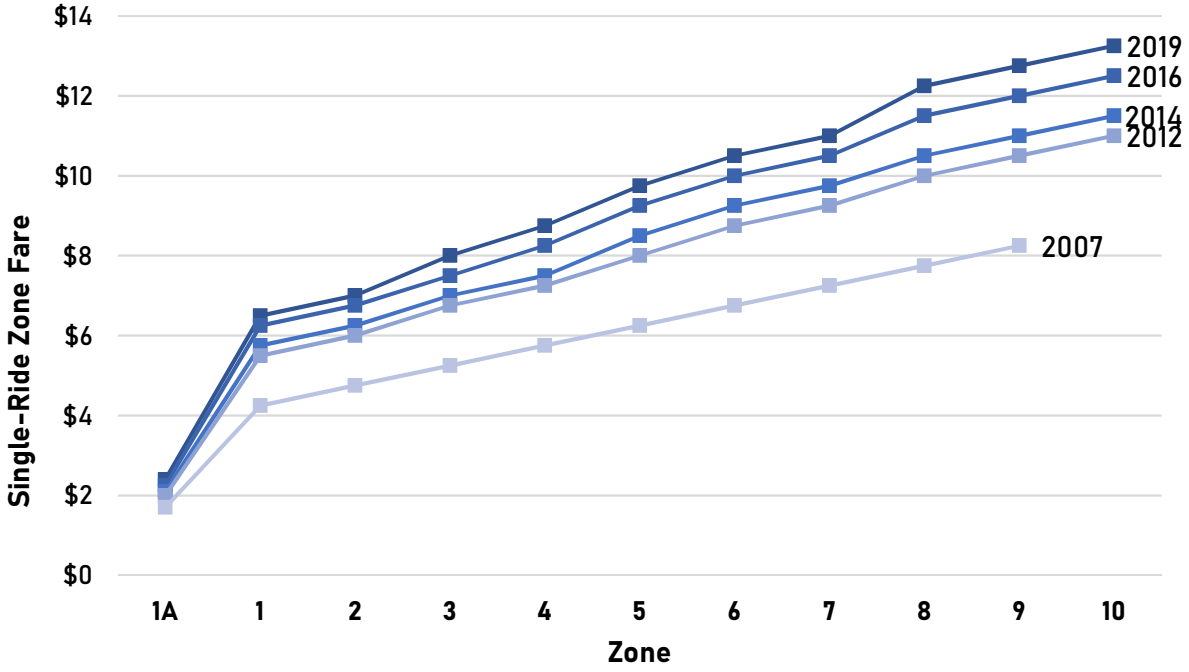
Zone Fares Implied by a Revenue-Neutral Constant Cost per Mile

Notes: Average track distance is a zone-level average of the distance from each station to the terminal, weighted by average daily inbound ridership from the CTPS 2018 counts.

Zones 1A and 1 are notable exceptions to the general relationship between distance and fares for the other zones, with an unusually high cost per mile for Zone 1 and a much lower cost per mile for Zone 1A. While Zone 1 trips are generally farther than Zone 1A trips, the increase in fare between Zone 1A and Zone 1 is disproportionate to trip distance. This leads to a large jump in both fare and cost per mile from Zone 1A to Zone 1. A disproportionate jump has existed since at least the 1990s, but fare changes over the years have widened the fare jump substantially, from +$2.55 in 2007 to +$4.10 today. This has led to adjacent stations with a large difference in fare. As discussed more in the next section, this growing differentiation between Zone 1A fares and Zone 1-10 fares also relates to competitiveness, but in ways that are not as closely tied to trip distance.

Finding: A large gap has developed between the Zone 1A fare and the Zone 1 fare.

Commuter Rail Zone Fares, 2007-2019



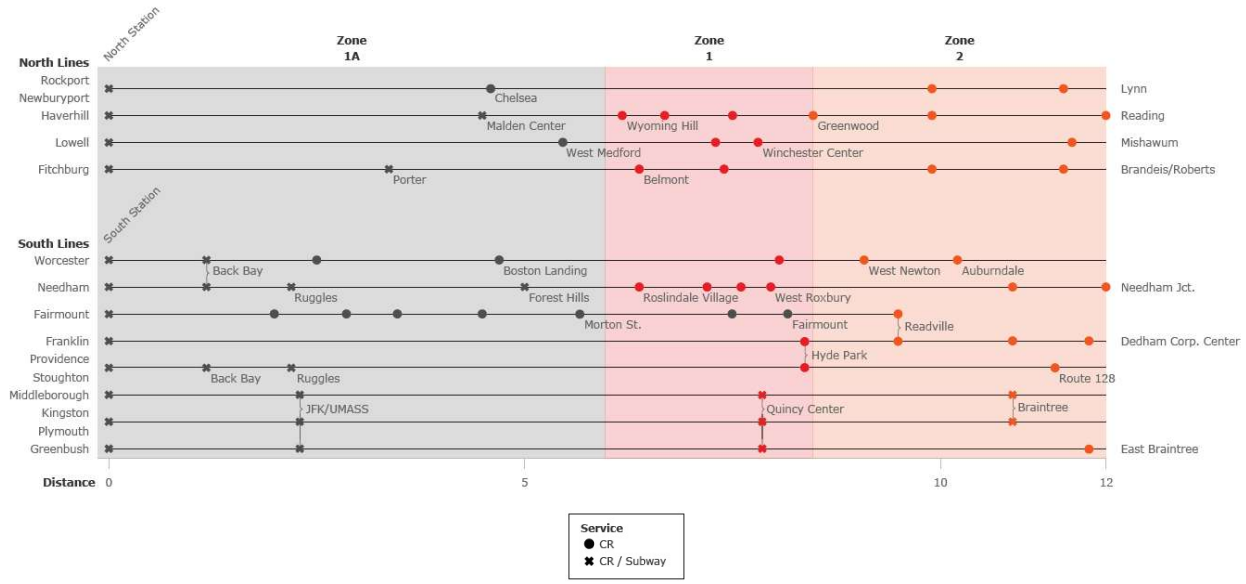
Source: MBTA. Labels show the year that fares went into effect.

The zone-level analyses above reflect the assignment of specific stations to each radial fare zone. At the station level, zone assignments are generally consistent with ranges of track distance. The first figure below zooms in on Zones 1A, 1, and 2, where assignment to zones has the most significant implications for fares. Within these zones, the only assignments that are not consistent with track distances are the Blue Hill Ave and Fairmount stations, which are served only by the Fairmount Line. These stops are within Zone 1A to keep fares for trips between these stops and South Station equivalent to a subway fare, due to the lack of rapid transit service in this area of Boston.

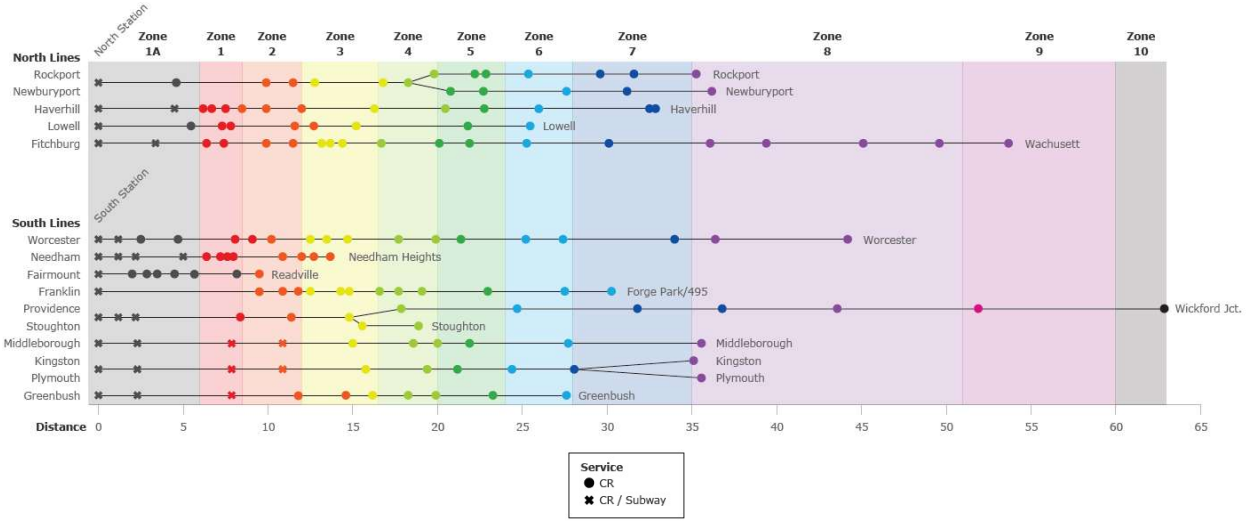
The second figure below shows all stations. Outside of Zone 2, there are several exceptions where stations are assigned one zone lower than would make the most sense by track distance from the terminal. This applies to several stations at the end of a line: Wachusett in Zone 8, Needham Center and Needham Heights in Zone 2 (though straight-line distances put these close to Needham Junction), and Forge Park/495 in Zone 6. Other notable exceptions – East Weymouth (Greenbush Line) in Zone 2 and South Attleboro (Providence Line) in Zone 7 – are assigned the same zone as other stations in the same municipality (Weymouth and Attleboro, respectively).

Finding: MBTA's zone-based fares and assignment of stations to zones are generally consistent with track distance from stations to downtown terminals.

Station Track Distances and Zone Assignments: Zones 1A, 1, and 2



Station Track Distances and Zone Assignments: All Zones



Notes: Colored distance bands for zones are illustrative approximations based on zone assignments of specific stations. MBTA does not define specific track distance ranges for fare zones.

Fares by Station Area Type

The elements of Commuter Rail fares that are least consistent with distance – Zone 1A fares and Interzone Fares – are connected closely to station area types. The characteristics of different station pairs affect the availability and cost of alternatives, making station area types a key driver of competitiveness for different trip types. This section describes the roles played by Zone 1A to differentiate fares based on competitiveness (and other policy goals), and it identifies some station area types that align neatly with this Zone 1A structure and others that create significant tradeoffs and tensions.

Key Station Area Characteristics

Commuter Rail station areas have very different physical and functional characteristics in several important respects:

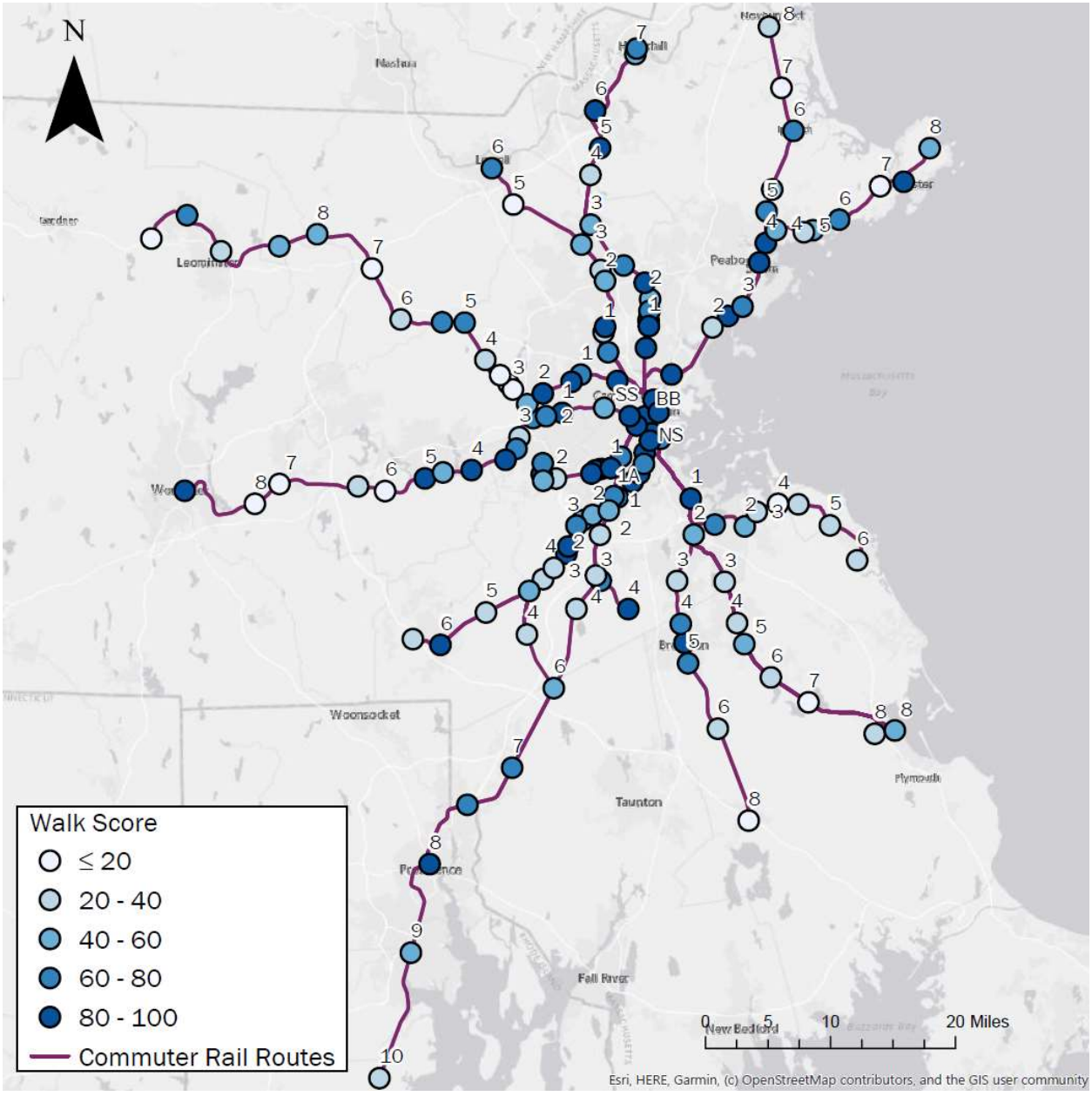
1. *Is the station an **origin** for commute and other trips?* This is driven by residential population with access to the station (by any mode).
2. *Is the station a **destination** for commute and other trips?* At destinations, jobs and/or other attractions are accessible from the station by foot, transit, or ride-share.
3. *Can the station be accessed **by car**?* Affordable and available parking provide accessibility for park-and-ride users.
4. *Can the station be accessed **without a car**?* Station areas that are densely developed with quality walking and biking infrastructure are accessible without needing to drive and park.

The areas surrounding Commuter Rail stations closer to downtown Boston are typically dense with expensive and/or limited parking and good non-driving access options (other transit, walking, and biking); these dense station areas can be employment centers (primarily destinations), have a mix of jobs and housing, or be residential neighborhoods (primarily origins). As one moves out of the core, most station areas shift to predominantly residential (origins) and are usually accompanied by low parking costs; in some cases these outer stations are in dense areas accessible by other modes, and they are sometimes also regional job centers (destinations).

The pattern of transition from **high density and expensive parking** in downtown Boston to **primarily residential areas with inexpensive parking** generally holds, but there are plenty of exceptions and transition areas. This is evident in the systemwide maps of Walk Score®, employment, and residential population below:

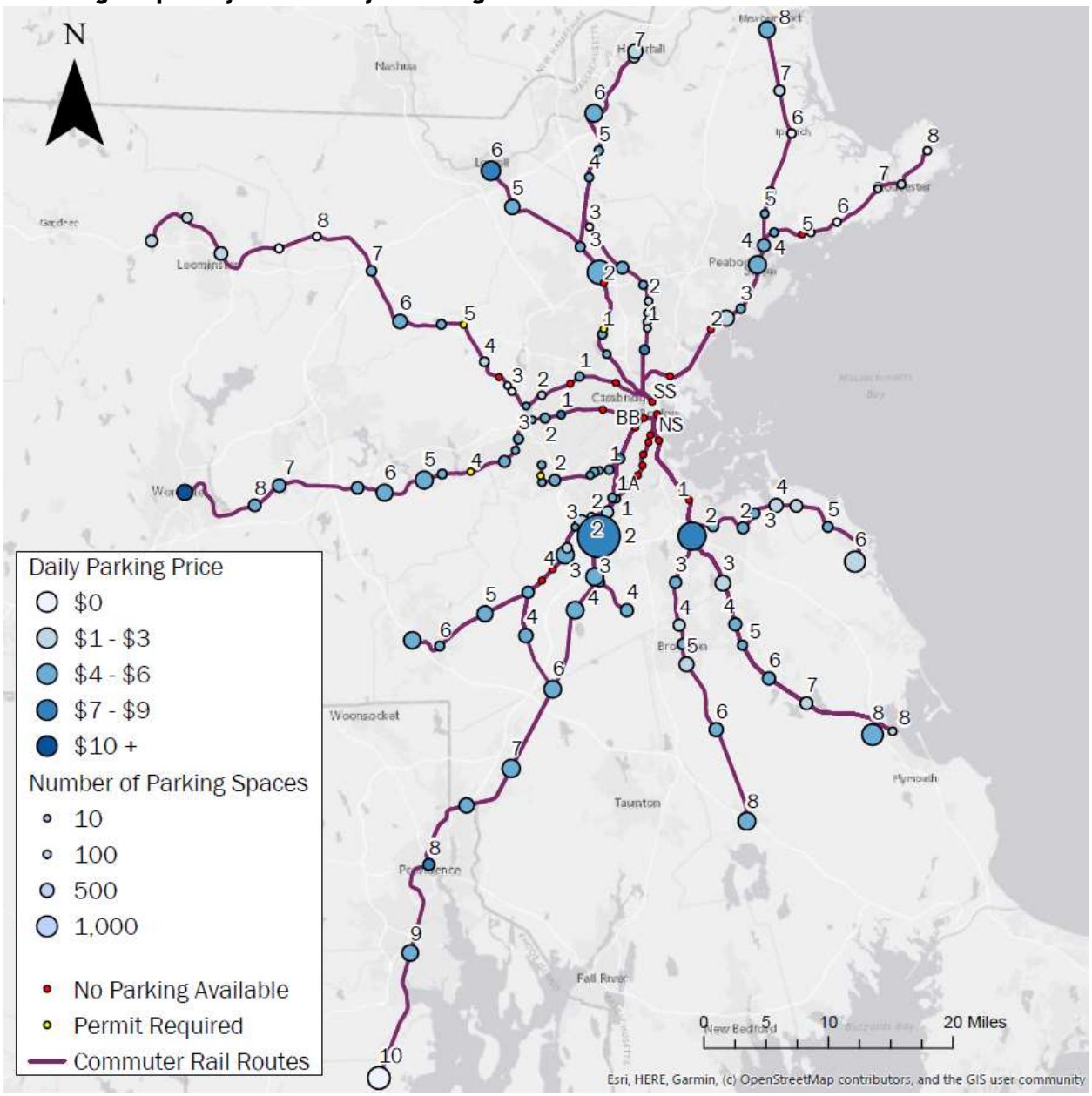
- Stations closer to the center of the city are generally more walkable/bikeable, have less and/or more expensive parking, and have greater job opportunities and a higher population within walking distance. They are accessible without a car and expensive to access with a car. However, there is a gradual transition, and stations like Chelsea and Boston Landing at the edge of the core may have inexpensive nearby parking options (even if not right at the Commuter Rail station).
- Stations outside of the city have fewer job opportunities and lower density, making them primarily origins. Walkability and bikeability tend to be lower, and inexpensive parking is generally available. Again, however, there are exceptions. Gateway cities like Lynn are employment destinations in addition to residential origins, and stations in city and town centers are often dense enough to support significant non-driving access. Parking availability and cost varies in these cases.

Walk Score of Commuter Rail Station Locations



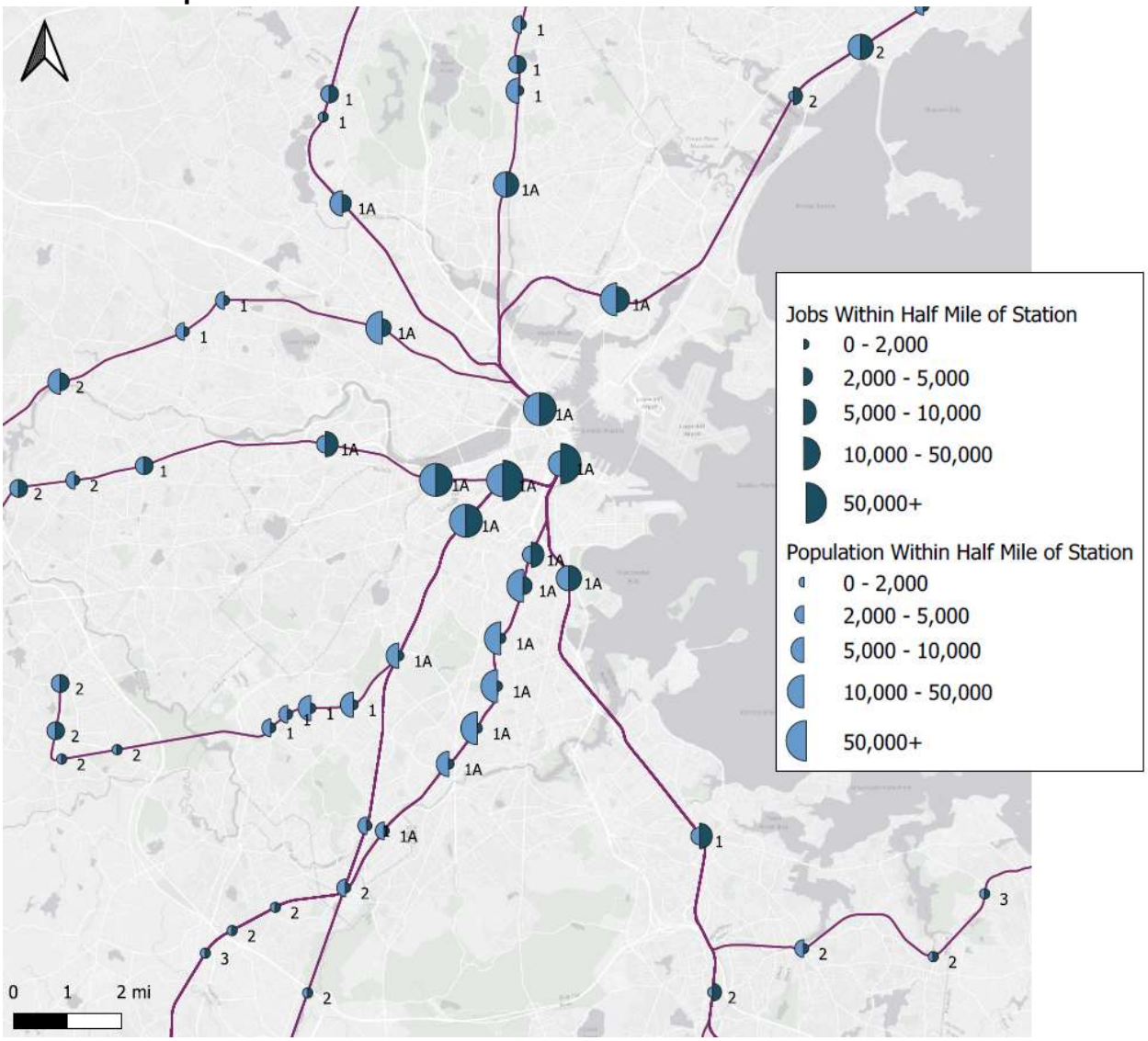
Source and Notes: Walk Score® (www.walkscore.com), a measure of the walkability of addresses.

Parking Capacity and Daily Pricing at Commuter Rail Stations



Sources and Notes: MBTA Systemwide Station Access Study (ongoing), https://www.mbta.com/parking/stations-and-rates. Reflects capacity and pricing for MBTA-owned, municipality-owned, and/or private parking at each station; does not include any other parking in the neighborhood of each station (such as unregulated street parking).

Jobs and Population Within Half Mile Walk of Commuter Rail Stations



Sources and Notes: Population data from 5-year American Community Survey (2012-2016). Employment data from Workplace Area Characteristics (Longitudinal Employer-Household Dynamics). Assumes even distribution of population and jobs within Census blocks, aggregated by the half-mile walkshed around each Commuter Rail station.

Relationship Between Station Area Types, Zone 1A, and Competitiveness

In the current MBTA fare structure, the composition of Zone 1A determines the fare type of each trip: whether it is a Zone 1A fare, a Zone fare, or an Interzone fare. Zone 1A fares and Interzone fares are much lower than Zone fares, so careful assignment of stations to Zone 1A is essential if these lower fares are to follow any general policy principles.

In which cases does this fare structure using Zone 1A create a clear separation between different trip types on the basis of competitiveness or other policy principles? This fare structure functions best when both Zone 1A stations and Zone 1-10 stations meet certain

conditions that conform to the *general* pattern of station area types highlighted in the previous section:

Ideal Zone 1A Stations	Ideal Zone 1–10 Stations
Close to downtown Boston	Outside downtown Boston
High density (origin, destination, or mix)	Primarily origin
High non-driving accessibility	High driving accessibility (low parking costs)
Low driving accessibility (high parking costs)	

These conditions create the following trip types:

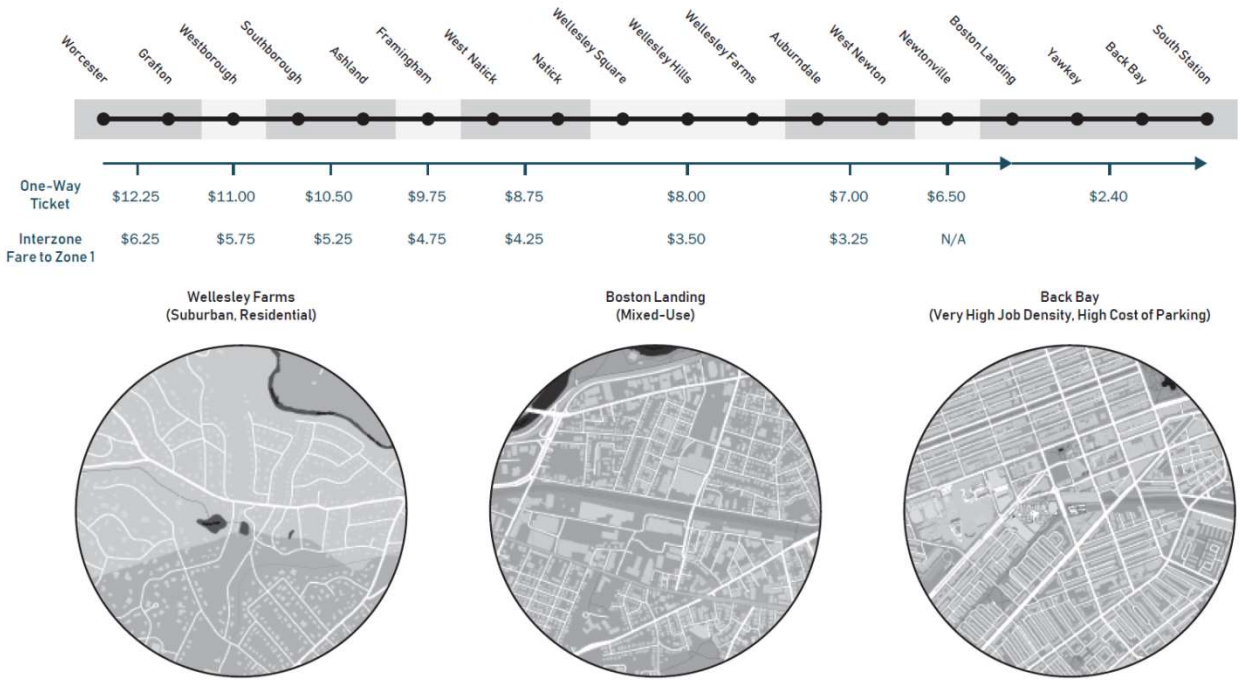
- **Trips entirely within Zone 1A** are taken between high-density locations with expensive parking inside the urban center. This is the geography that is also generally served by subway and buses, so lower fares for Zone 1A trips could be appropriate under policy principles of competing with available transit alternatives, providing easy substitution between subway and Commuter Rail that enhances system reliability and operations, and improving equity by filling geographic gaps in subway service for similarly situated neighborhoods.
- **Trips crossing into or out of Zone 1A** are trips from Zone 1-10 stations (origins) to Zone 1A stations (destinations) with high parking costs (as well as return trips). Competitive fares for these Zone trips are higher, since Commuter Rail provides an alternative to the high cost of parking in Zone 1A.
- There are relatively few **trips entirely within Zones 1 through 10** since these stations are all primarily origins, but a lower fare for these Interzone trips is warranted to compete with the low cost of driving and parking.

However, when these ideal station conditions do not hold, Commuter Rail fares can become uncompetitive with available alternatives for certain segments of trips. This arises especially in the following situations illustrated by the examples of Boston Landing in Zone 1A (in the diagram below) and Lynn in Zone 2.

1. *Destinations inside Zone 1A with low parking costs*. If an area around a Zone 1A station has low parking costs, then Zone fares become uncompetitive with driving and suppress demand. One example of this tension is Boston Landing, shown in the diagram below. The area of Allston around Boston Landing has a mix of residential and commercial land uses, making it both an origin and a destination. In addition, this area close to the edge of the downtown core has *relatively* cheap parking compared to downtown Boston. As a result of its assignment to Zone 1A, Boston Landing residents have lower Zone 1A fares to South Station, but Zone trips to Boston Landing employers from Zones 1 to 10 are less competitive with driving and parking. If Boston Landing were re-assigned to Zone 1, its competitiveness as a destination would improve, but at the expense of competitiveness for trips to downtown Boston.

2. *Destinations outside of Zone 1A with low parking costs*. If a Zone 1 through 10 station is also a destination and could generate reverse-commute travel from Zone 1A stations, Zone fares will not be competitive with inexpensive parking. An example is Lynn in Zone 2. In addition to being an origin to downtown, Lynn is a job center and destination from Chelsea and other neighborhoods inside Zone 1A; however, the Zone 2 fare from Zone 1A to Lynn is not very competitive with driving given the ample, inexpensive parking in Lynn.
3. *Destinations inside or outside Zone 1A served by both Commuter Rail and bus/subway.* Commuter Rail stations that are also served by bus or subway compete with these transit alternatives, and high Commuter Rail fares can lead to inefficient use of slower, less-direct bus and subway service. This again describes Lynn, where a slow local bus trip can be used to avoid a Zone 2 Commuter Rail fare. Similarly, *if* Boston Landing were re-assigned as a Zone 1 station, it would lead to some inefficient use of buses and the Green Line to avoid the higher Commuter Rail fare.

Station Area Examples: Framingham/Worcester Line



In summary, by defining three different trip types using Zone 1A, the MBTA is able to set fares that are competitive in three different settings – sustaining lower fares for Zone 1A trips (which compete with low bus/subway fares) and Interzone trips (which compete with inexpensive parking costs). However, exceptions to the "ideal" set of station types creates tradeoffs in certain situations that cannot be easily differentiated or avoided within the current fare structure. Specifically, the current fare structure does *not* provide lower fares for round trips that leave or enter Zone 1A *but* compete with low parking costs and/or lower-

cost transit alternatives. Lower fares for these types of trips would be ideal from a competitiveness standpoint.

Finding: Round trips that enter or leave Zone 1A but have low parking costs or other transit options are priced too high to compete effectively with lower-cost alternatives.

The policy analyses in the next section of the report explore near-term options to address these gaps in competitiveness. Achieving lower fares in these situations by moving stations into or out of Zone 1A has significant trade-offs and unintended consequences. For addressing (a), we propose piloting lower fares for reverse-commute and off-peak travel. For addressing (b), we propose reducing the difference between Zone 1A and Zone 1 fares to mitigate the adverse impact of Zone fares on these trips.

Fares Relative to Other Modes

Many of the potential policy rationales for setting Commuter Rail fares require a comparison between Commuter Rail and *other* modes of travel. For any given trip, are Commuter Rail fares "competitive" with alternatives? Is the quality of service on Commuter Rail higher or lower than other transit options? Where does Commuter Rail complement the subway network, either by filling gaps in the subway service area or providing redundancy and additional capacity to crowded subway corridors?

This section focuses on these interrelated questions and describing the *competitiveness* of Commuter Rail relative to alternatives:

1. other MBTA modes (bus and subway), and
2. driving and parking.

We focus on how these options compare in terms of service quality and cost for trips from each Commuter Rail station to the downtown Boston terminals. For a quantitative comparison of service quality, we use in-vehicle travel time based on MBTA service schedules and typical road traffic at 8am on weekdays. For costs, we compare Commuter Rail station parking and round-trip fares with the round-trip cost of fuel, tolls, and downtown parking.

Quality and cost are multifaceted. Our quantitative comparisons of in-vehicle travel time and certain travel expenses should be viewed as a baseline or reference point, since there are many other factors that vary widely based on individual circumstance. It is important to consider that the competitiveness of Commuter Rail – the degree to which it is viewed as a premium service – can depend on these other factors:

- Station access times. The time needed to access a Commuter Rail station depends on residential location. Commuter Rail may be a premium service for residents living near a station, while those farther away may save time driving.
- Service frequency. The frequency of Commuter Rail service determines whether riders can flexibly arrive at a station and expect a short wait time, or whether they

need to plan their schedules around MBTA train schedules to avoid long waits for the next train. Unlike subway or key bus routes, MBTA Commuter Rail service is currently infrequent enough during peak periods (and certainly off-peak) that advanced planning is typically required and the time cost of missing a train can be high. Riders who cannot flexibly arrange their activities around train schedules may experience longer wait times and additional stress, making Commuter Rail less competitive with other options.

- **Reliability.** While Commuter Rail service is sometimes delayed or disrupted, Commuter Rail travel times are typically more consistent than bus or driving times (which can vary substantially day-to-day with changing traffic conditions).
- **Comfort.** Commuter Rail comfort includes the difficulty of accessing a Commuter Rail station (such as a long walk) and comfort on the train – crowding, seat comfort, ability to use travel time for work or leisure, etc. Individual preferences vary between the comfort of traveling alone in a personal vehicle (perhaps in traffic) and the comfort of riding Commuter Rail.
- **Station access options**. The cost of using Commuter Rail depends on whether an individual is able to access a station by some means other than a car, or whether they need to drive and park at the station.
- **Driving cost accounting.** In this section we use the cost of fuel, tolls, and downtown parking to evaluate the competitiveness of driving. In reality, the all-in cost of driving is much higher due to depreciation and maintenance. People typically do not consider the full cost of driving when making travel choices,[7] but some may be more attuned than others.
- **Subsidies for parking and transit**. Some employers provide free or subsidized parking, and some also subsidize transit. These subsidies change the cost comparison between options.
- **Income and cost constraints.** For low-income individuals, higher fares not only affect competitiveness but run into hard cost constraints and prevent MBTA travel (even if travel alternatives are poor). For these groups, MBTA fares play a key role in accessibility. Access and affordability are discussed more at the end of this section.

We do not provide a quantitative analysis of competitiveness for *Interzone* trips – trips between two stations in Zones 1 through 10. Since parking is often free or much lower in these zones than in downtown Boston, driving becomes much lower cost and more attractive. From a competitiveness standpoint, this supports the MBTA's current practice of setting Interzone fares much lower than Zone fares in order to keep Interzone trips competitive with driving.

[7] Feiler, Daniel C., and Jack B. Soll. "A blind spot in driving decisions: How neglecting costs puts us in overdrive." *Climatic change* 98.1-2 (2010): 285.

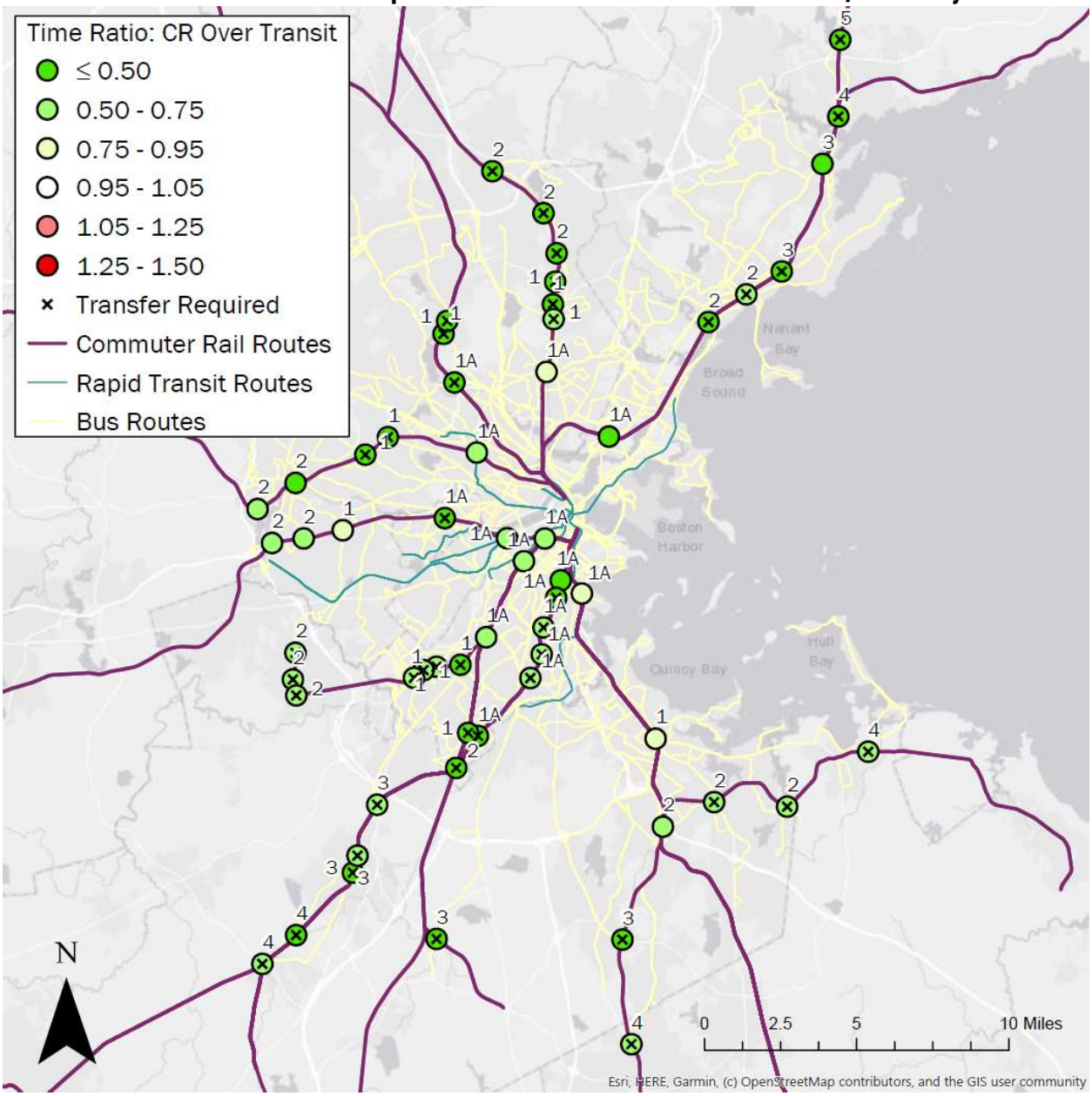
Commuter Rail and Other MBTA Transit Modes

The Commuter Rail network extends much farther outside Boston than other MBTA services, so at many Commuter Rail stations there is no transit alternative for reaching downtown Boston. In the inner Zones however, certain corridors provide bus and subway options in addition to Commuter Rail.

The map below shows the ratio between the resulting Commuter Rail travel times and bus/subway travel times. When the ratio is 1, the travel time is the same using Commuter Rail and other transit options. When the ratio is above 1 Commuter Rail has a worse (longer) travel time, and when it is below 1 Commuter Rail has a better (shorter) travel time than bus and subway. Bus/subway trips that require a transfer – reducing comfort and reliability – are marked with X's.

As a broad pattern, the in-vehicle speed "premium" of Commuter Rail increases the farther you are from downtown Boston. In a few cases, this pattern is broken due to the specific geography of Commuter Rail and the subway lines; some Commuter Rail stops are adjacent to or near subway stops, resulting in similar travel times for the transit alternatives. Even when stations are served by subway and Commuter Rail, Commuter Rail tends to be at least 10-25% faster than bus and subway service to the downtown terminal. However, as noted earlier the higher frequency of subway service (and some bus service) provides an advantage in convenience and lower wait times; this likely outweighs the marginal in-vehicle travel time difference for many riders.

In-Vehicle Travel Time Comparison: Commuter Rail and Bus/Subway

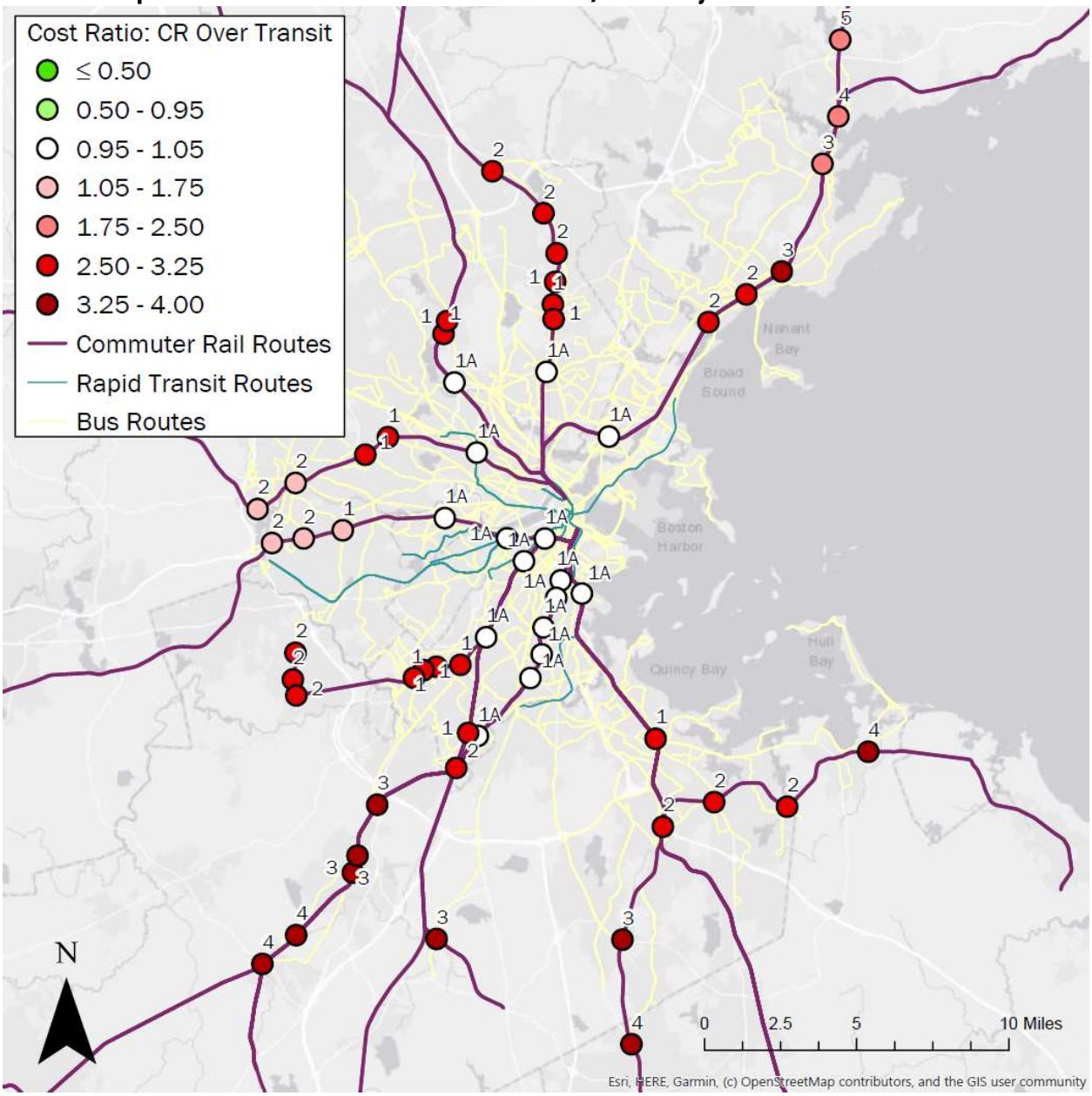


Sources and Notes: In-vehicle travel times (excluding access/egress time) are selected based on MBTA service schedules around 8am on weekdays (accessed via Google Maps). Commuter Rail travel times are from each station to the terminal. Bus/subway times are in-vehicle travel times (including any transfer time) to downtown Boston for the fastest nearby option (though Local Bus and subway are selected over Express Bus if the travel times are within 10 minutes). Ratios below 1 indicate that Commuter Rail has a better (shorter) travel time than bus and subway. Stations without a nearby bus/subway option are excluded.

How do Commuter Rail and other transit options compare on cost? The map below shows the ratio of a Commuter Rail fare to the fare for the best transit alternative at each station. Nearly all of the transit alternatives to Commuter Rail include a subway ride, making the alternative fare $2.40 per trip. This is equal to the Commuter Rail fare inside Zone 1A, but it is a small fraction of the Commuter Rail fare for stations outside of Zone 1A. Given the much faster service to downtown on Commuter Rail for these farther stations, this fare difference between Zone Commuter Rail and subway *could* be consistent with a policy principle of charging higher fares for better quality of service, but still needs to be weighed against lower service frequencies for Commuter Rail.

In combination, as one gets farther from downtown, Commuter Rail becomes more competitive in terms of speed or time, and less competitive in terms of cost. Within Zone 1A, Commuter Rail has equal cost and higher speed, but less frequent service.

Cost Comparison: Commuter Rail and Bus/Subway

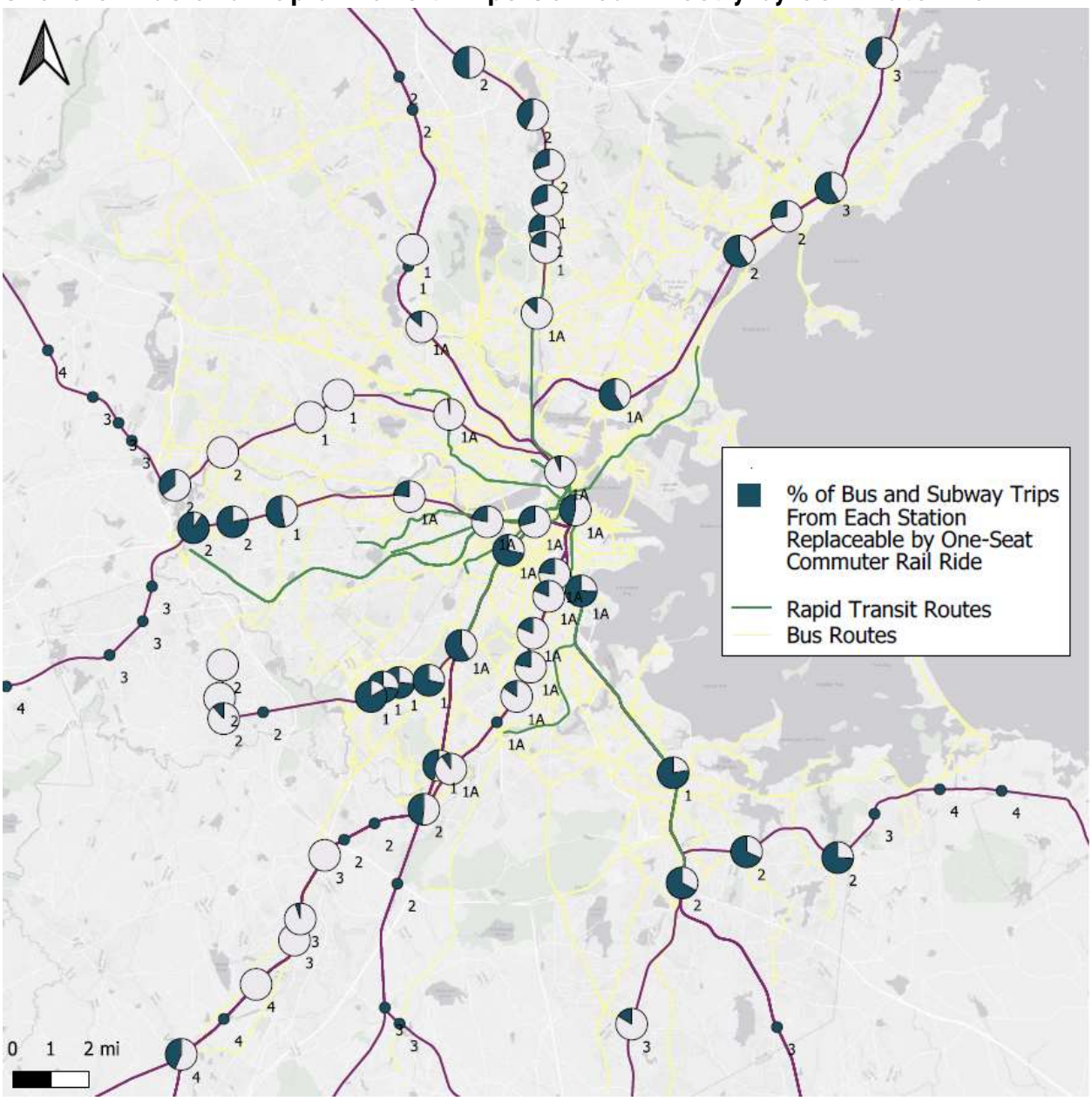


Sources and Notes: Commuter Rail cost is a round-trip Zone fare to the downtown terminal. Bus/subway cost is a round-trip fare based on the trips selected for the in-vehicle travel time comparison above – generally the fastest nearby bus/subway option to downtown Boston, though Local Bus and subway are selected over Express Bus if the travel times are within 10 minutes. Ratios above 1 indicate that Commuter Rail has a higher cost than the bus/subway alternative. Stations without a nearby bus/subway option are excluded.

In reality, how do people weigh these service and cost trade-offs between Commuter Rail and bus or subway? As an initial look, we analyzed bus and subway tap data from the area of each Commuter Rail station and estimated the share of bus and subway trips that *could* have been taken on Commuter Rail. Higher suggest that many riders prefer bus or subway to Commuter Rail.[8] The highest shares of bus and subway trips that could have been replaced by Commuter Rail are along rapid transit lines – the southern half of the Red Line, the Orange Line, and the Green Line. Subway trips from these stations are generally slower than Commuter Rail and have the same fare, but many riders evidently prefer subway due to its higher service frequencies (providing flexibility and shorter wait times than Commuter Rail).

[8] Note that the shares in the map depend substantially on current bus and subway service. For example, the Fairmount Line has a low share of bus/subway trips that could have been taken on Commuter Rail, but this largely reflects a relative lack of bus and subway service to downtown Boston from those neighborhoods; as a result, most bus trips in those station areas are to non-downtown destinations and are not "replaceable" by Commuter Rail.

Share of Bus and Rapid Transit Trips Served Directly by Commuter Rail



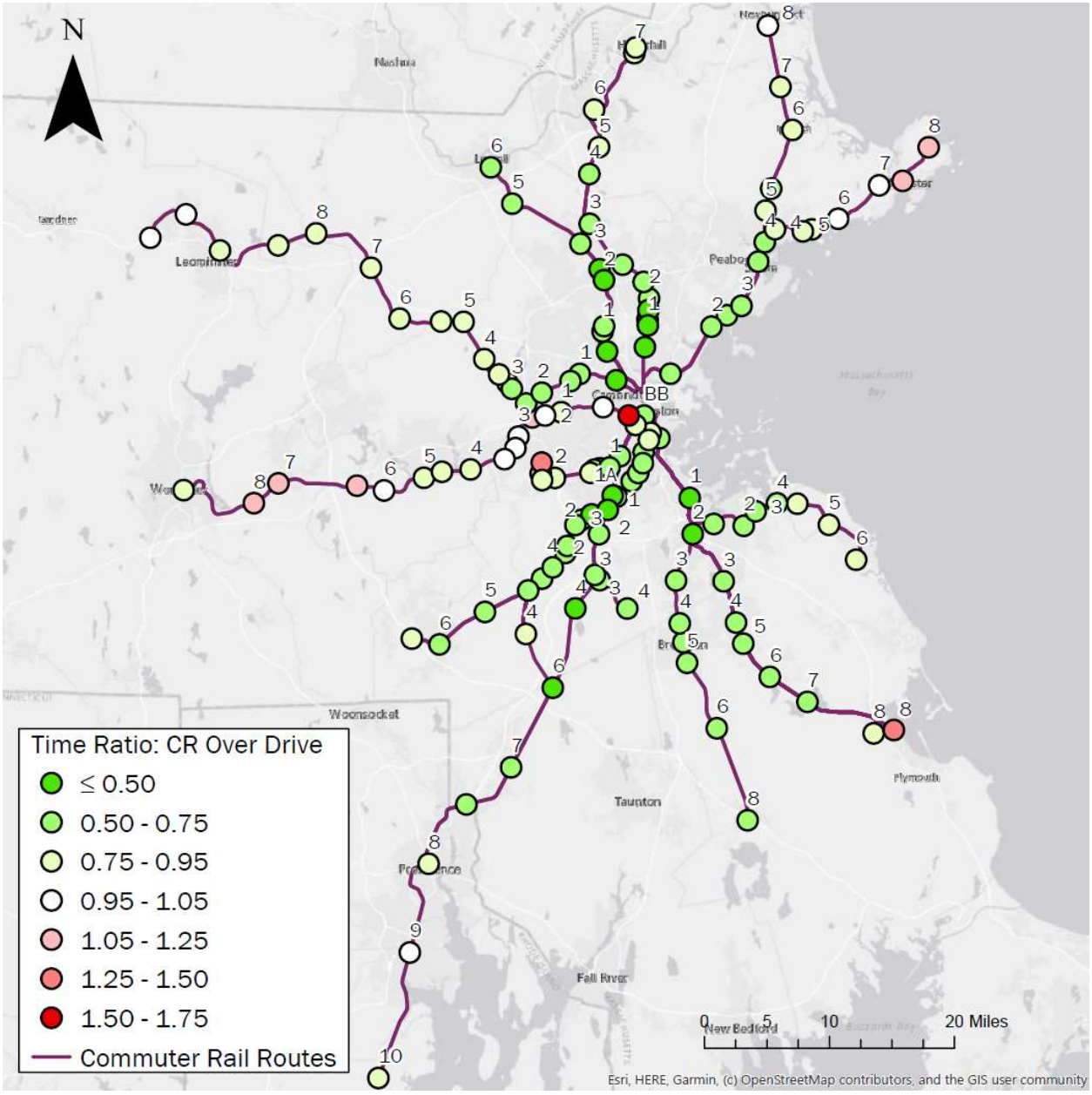
Sources and Notes: Based on scaled MBTA origin-destination-transfer (ODX) inference data for bus and subway travel. Figures shows percent of bus and subway trips starting within 800 meters (1/2 mile) of each Commuter Rail station that also have destinations within 800 meters (1/2 mile) of a stop on the same commuter rail line (i.e. bus and subway trips that could have been served directly by Commuter Rail).

Commuter Rail and Driving

While Commuter Rail only competes with other transit options closer to the city, it competes with driving throughout the entire network.

The map below shows the ratio of estimated Commuter Rail travel times to estimated driving times from each station to the downtown Boston terminal. We estimated driving times using ArcGIS Pro Network Analyst at 8am on a weekday (Wednesday 1/29/2020), including typical traffic. As explained earlier, Commuter Rail travel times are in-vehicle travel times, *not including access or wait time*. Under these assumptions, Commuter Rail is faster than driving from most stations, but the in-vehicle time savings is largest for stations in the inner zones (where driving options are city streets or congested highways), and Commuter Rail is similar to or slower than driving for stations at the edges of the network. The Worcester Line is somewhat of an exception, where the Commuter Rail times are similar to driving on the Mass Pike for the whole length of the line.

In-Vehicle Travel Time Comparison: Commuter Rail and Driving, 8AM Weekday



Sources and Notes: Commuter Rail in-vehicle travel times from station to downtown terminal (excluding access/egress time) are selected based on MBTA service schedules around 8am on weekdays (accessed via Google Maps). Driving times are estimated from each station to the downtown terminal using ArcGIS Pro Network Analyst at 8am on a weekday (using Wednesday 1/29/2020) and reflect typical congestion; these estimates are similar to but a bit faster than Google Maps "best guess" driving times at 8am on weekdays (average of 4 minutes faster). Ratios below 1 indicate that Commuter Rail has a better (shorter) travel time than driving.

In order to compare daily Commuter Rail and driving costs, we needed to make several assumptions:

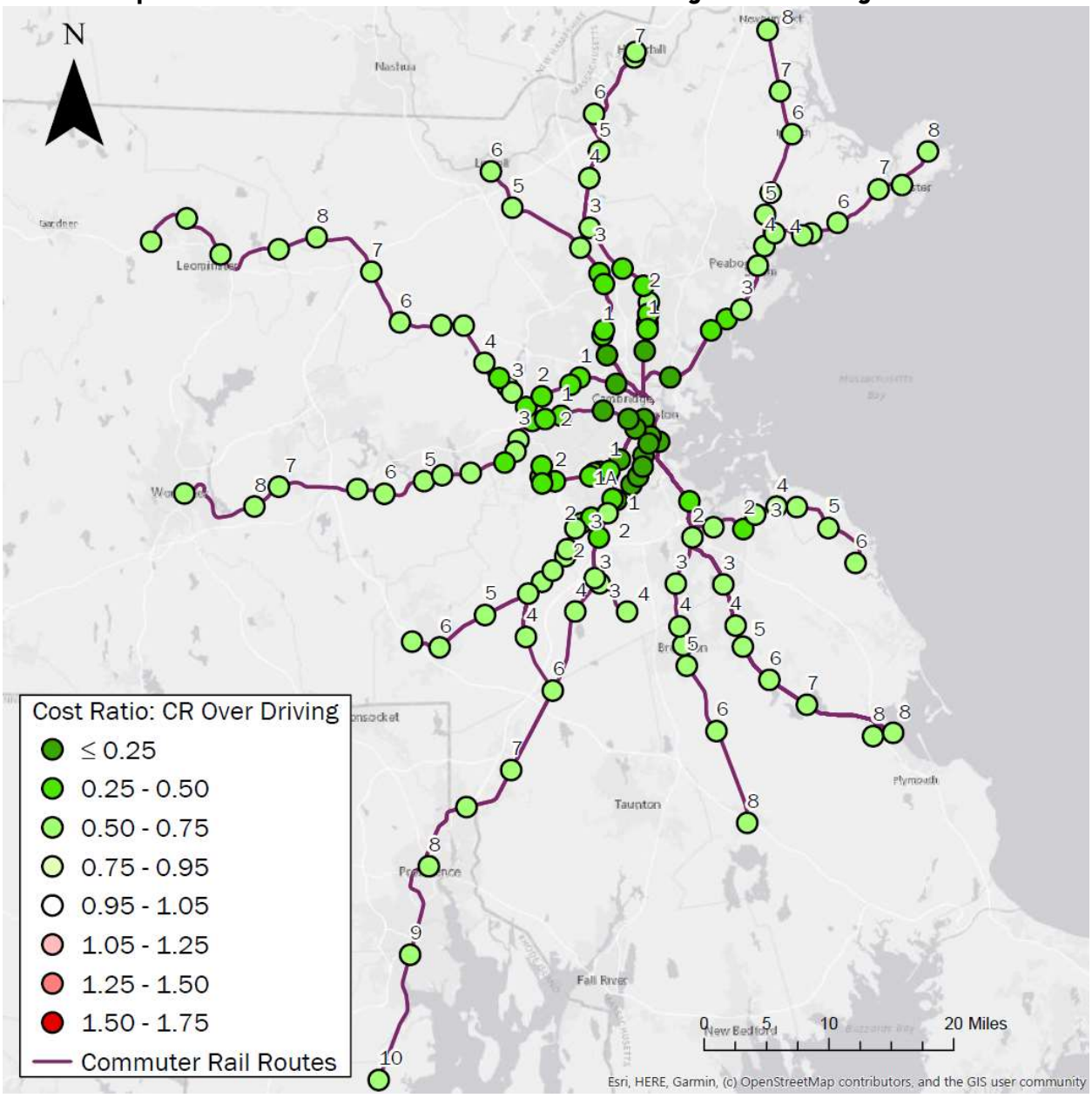
- **Daily round-trip Commuter Rail cost:** The cost comparison between Commuter Rail, bus, and subway simply used fare levels, since it is reasonable to assume that riders either accessed the station without a car or needed to park at the station to access both transit options. For a comparison with driving, however, we use two different costs – a round-trip Commuter Rail fare plus a daily parking fee (for riders who drive and park at the station) and a round-trip Commuter Rail fare with no parking costs (for those who access the station by walking, biking, other transit, or other means). Current daily parking fees at each station are shown on the MBTA web site.[9]
- **Daily round-trip driving cost:** As discussed earlier, actual driving costs vary by vehicle and by each individual's downtown parking options (such as free or subsidized parking through an employer). For this comparison, we include a downtown parking cost of $24.88 – the average of daily and prorated monthly parking rates for Boston from Parkopedia's 2019 Parking Index for North America.[10] The full cost of driving includes fixed costs like insurance and depreciation, non-fuel variable costs like tires and repairs, and fuel. For this competitiveness analysis we only include fuel costs on the assumption that people are mostly likely to consider fuel cost when comparing their commute options and are likely to underestimate or ignore all other vehicle-related costs of driving.[11] Fuel costs are estimated at $0.116 per mile based on AAA's Your Driving Costs 2019. Tolls were estimated using the TollGuru calculator and included in both travel directions, but were excluded if tolls could be avoided with a detour under 10 minutes at 8am on a weekday.[12]

The following maps show the ratio of Commuter Rail cost (first without parking, then with parking) to driving cost (always including parking in downtown Boston).

As discussed earlier, Commuter Rail fares include a fixed component and a component that increases with distance, resulting in a decrease in per-mile cost as trips get longer. The same structure applies to daily driving costs, but the fixed component is larger due to downtown parking costs and the variable component (only including fuel cost) is smaller. As a result, Commuter Rail is most competitive on a cost basis for shorter trips because it avoids the cost of downtown parking, and its competitive advantage diminishes for longer trips. However, Commuter Rail maintains at least a 20% cost advantage over driving even for long trips.

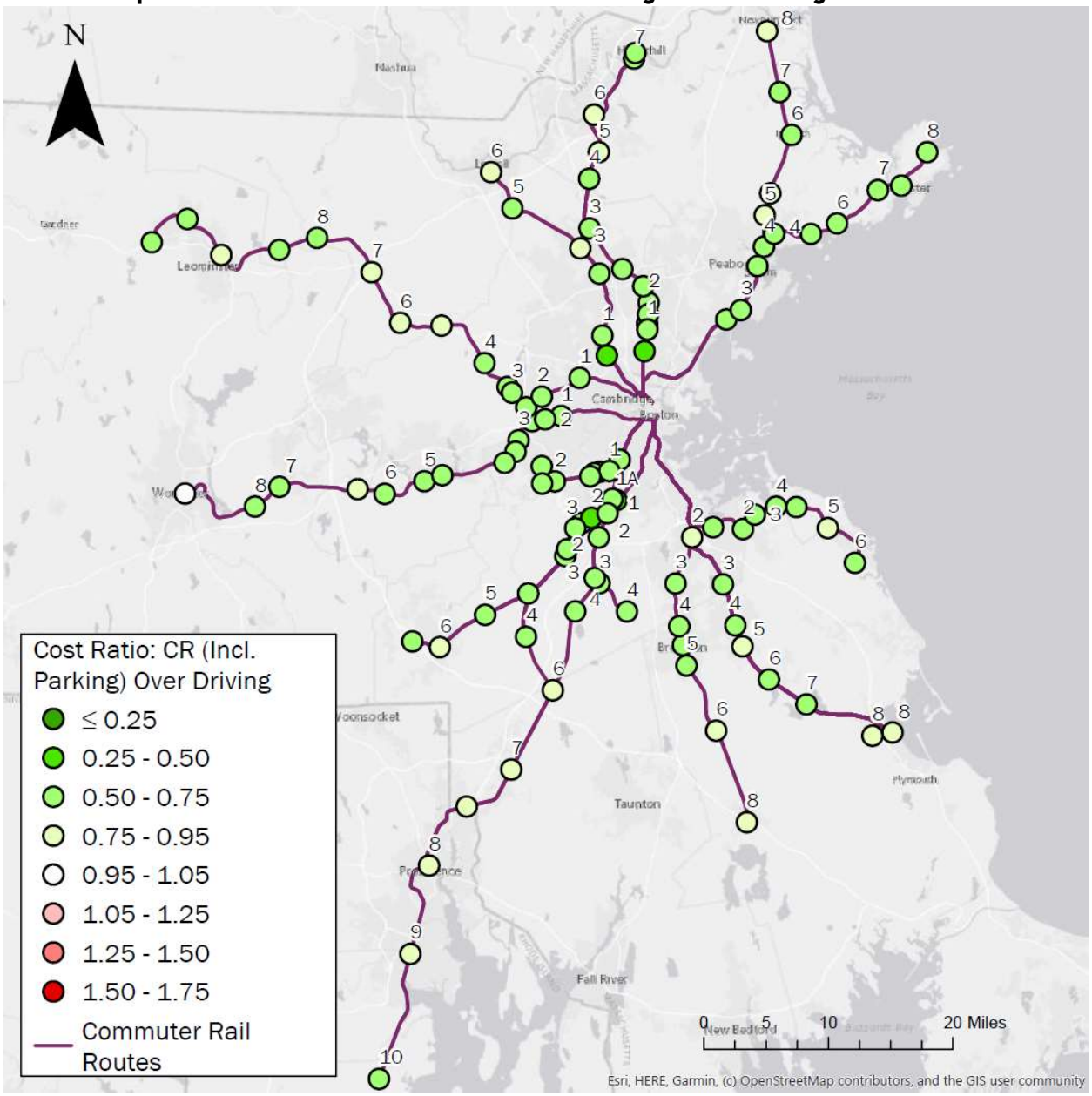
[9] https://www.mbta.com/parking/stations-and-rates
[10] https://business.parkopedia.com/2019-north-america-parking-index
[11] Feiler, Daniel C., and Jack B. Soll. "A blind spot in driving decisions: How neglecting costs puts us in overdrive." Climatic change 98.1-2 (2010): 285.
[12] https://tollguru.com/car-toll-calculator

Cost Comparison: Commuter Rail Without Parking and Driving



Sources and Notes: Commuter Rail cost is a round-trip Zone fare to the downtown terminal. Driving cost is round trip fuel cost ($0.116 per mile based on AAA's Your Driving Costs 2019), round trip tolls (using the TollGuru calculator), and downtown parking cost ($24.88, the average of daily and prorated monthly parking rates for Boston from Parkopedia's 2019 Parking Index for North America). Ratios below 1 indicate that Commuter Rail has a lower cost than driving.

Cost Comparison: Commuter Rail With Parking and Driving



Sources and Notes: Commuter Rail cost is a round-trip Zone fare to the downtown terminal plus the cost of parking at the Commuter Rail station. Driving cost is round trip fuel cost ($0.116 per mile based on AAA's Your Driving Costs 2019), round trip tolls (using the TollGuru calculator), and downtown parking cost ($24.88, the average of daily and prorated monthly parking rates for Boston from Parkopedia's 2019 Parking Index for North America). Ratios below 1 indicate that Commuter Rail has a lower cost than driving. Stations without parking at the Commuter Rail station are excluded.

The table below summarizes the time and cost comparisons for Commuter Rail and driving by zone. Commuter Rail is generally more competitive with driving for inner zones than outer zones. In-vehicle time is typically lower for Commuter Rail, but incorporating station access time and wait time would cancel or reverse this advantage in many cases (especially in outer zones where the in-vehicle time difference is smallest). While Commuter Rail does not always have a speed advantage, it is considerably less expensive than driving from stations throughout the entire system if daily downtown parking costs are considered (even when all vehicle-related costs except fuel are ignored).

Average In-Vehicle Time and Daily Costs for Travel from Commuter Rail Stations to Downtown Boston: Commute Rail vs. Driving

Station Zone	In-Vehicle Time Ratio (Commuter Rail / Driving)	Daily Round-Trip Cost Ratio, With Commuter Rail Parking (Commuter Rail / Driving)	Daily Round-Trip Cost Ratio, No Commuter Rail Parking (Commuter Rail / Driving)
1A	0.73	0.42	0.18
1	0.58	0.62	0.47
2	0.68	0.62	0.48
3	0.69	0.66	0.54
4	0.68	0.69	0.57
5	0.75	0.75	0.63
6	0.77	0.75	0.64
7	0.85	0.76	0.65
8	0.94	0.79	0.69
9	0.99	0.80	0.67
10	0.92	0.65	0.65

Sources and Notes: For sources, see maps and text. Ratios are simple averages across all stations in each zone. North Station and South Station are excluded from the Zone 1A averages.

Finding: For travel from Commuter Rail stations to the downtown terminals, Commuter Rail is generally competitive with driving and parking in downtown Boston. The competitiveness of Commuter Rail with driving for any particular trip depends on many case-specific factors.

Competitiveness vs. Access and Affordability

The analysis in this section focuses primarily on competitiveness. When evaluating costs, competitiveness is *often* a more useful framework than affordability or access; for many potential riders, higher fares would make Commuter Rail less competitive, but not unaffordable or financially inaccessible.

However, individuals and families with low incomes have hard cost constraints and are unable to routinely pay fares above a certain level, even if they do not have good travel alternatives. MBTA Commuter Rail fares that are competitive with driving can still be unaffordable *for these groups*. Accessibility is typically measured using travel times, but for cost-constrained riders MBTA fares also play a key role in accessibility. A recent study by two researchers at Conveyal (Matthew Conway and Anson Stewart) uses an MBTA case study to

illustrate that lower Commuter Rail fares can have a substantial impact on access to jobs within a 60-minute commute for individuals who are cost-constrained.[13]

As described in the background section, the MBTA currently provides reduced Commuter Rail fares to several groups of riders including students, seniors, and people with disabilities. However, current fares can make Commuter Rail travel inaccessible for low-income riders who do not qualify for existing reduced fare programs. The next section evaluates options for improving equitable access to Commuter Rail.

Finding: Fares may be unaffordable for low-income populations throughout the system who do not have access to existing reduced fare programs.

Review of Policy Principles

The analysis in this section shows that among many potential policy principles or rationales, the current MBTA Commuter Rail fare structure is most clearly organized around the following principles:

1. **Trip distance**, approximated by zones and capturing elements of both competitiveness and operating costs.
2. **Competitiveness** of Commuter Rail with driving and with other transit options.
3. **Operating cost**, which varies with trip distance and often aligns with competitiveness.
4. **Quality of service** across transit options, including consideration for both speed and frequency of service.
5. **Access and affordability** of transit, including rail service at subway-like fares within the urban center.

Current Commuter Rail fares reflect a balance of these policy principles, and the analysis in this section suggest several opportunities to improve fares. On the whole, however, Commuter Rail fares are generally consistent with this set of principles.

Finding: There are many potential policy principles for setting fares. MBTA Commuter Rail fares are primarily organized around principles of trip distance and competitiveness (also accounting in some ways for principles of operating cost, quality of service, and access and affordability).

[13] Conway, Matthew Wigginton, and Anson F. Stewart. "Getting Charlie off the MTA: a multiobjective optimization method to account for cost constraints in public transit accessibility metrics." *International Journal of Geographical Information Science* 33.9 (2019): 1759-1787.

Opportunities to Change Commuter Rail Fare Policy

There are several possible reasons to make changes to the Commuter Rail fare structure:

- To correct inconsistencies, address problems, and take advantage of opportunities consistent with ***existing*** **policy principles**.
- To prioritize ***different*** **policy principles** and bring fares into alignment with those new priorities.
- To apply policy principles to any **major changes in the service model or fare collection system** (such as changes that occur as part of the Rail Transformation effort or the MBTA's Fare Transformation project).

This sets up multiple opportunities to revisit and adjust the Commuter Rail fare structure. Each change should move incrementally toward a long-term vision.

The next section will examine two challenges and one opportunity with the *existing* policy principles, service model, and fare collection system:

1. Improving equity,
2. Addressing the jump in fares between Zone 1A and Zone 1, and
3. Taking advantage of excess capacity using off-peak and reverse-commute fares.

This study does not focus on what Commuter Rail fares should look like under *different* policy principles, or on the changes in fares needed to align with major changes in the service model and fare collection system that occur in the future. Any fundamental changes to Commuter Rail fares should involve a broader public discussion and should be informed by additional information about the operating costs and service characteristics of the future Commuter Rail service model.

Policy Analysis

Improving Equity on Commuter Rail

Why Equity?

A key objective of MBTA fare policy is improving social equity. This involves setting fare levels that account for the needs of different populations, and ensuring that any fare changes neither disproportionately benefit upper-income riders, nor disparately benefit white riders.

In the previous section, we noted that affordability of Commuter Rail for low-income populations is not a guaranteed by-product of the other organizing principles for Commuter Rail fares. Current fares are generally competitive with driving (which is essential for viability) and consistent with trip distance and operating cost, but there are still low-income people who are priced out. The MBTA has several reduced fare programs aimed at lifting cost constraints and ensuring access for students, seniors, people with disabilities, and other populations. How can access and affordability be improved for low-income groups that are not already eligible for reduced fares?

In answering this question, it is also essential to consider fare equity in relation to *all* Commuter Rail riders and *all* MBTA modes. For example, improving affordability on Commuter Rail by lowering all Commuter Rail fares would provide an unfair benefit to high-income riders and to users of one mode over the others. How can access to Commuter Rail for low-income populations be improved without unfairly favoring Commuter Rail or high-income riders?

Measuring Equity for MBTA Commuter Rail

The MBTA is required to evaluate equity in a particular way under Title VI. The Federal Transit Administration (FTA) Title VI Circular directs transit providers to study all proposed fare changes (increases or decreases) for:

1. Disparate Impact on minority riders/communities
2. Disproportionate Burden on low-income riders/communities

The MBTA's threshold for determining when proposed fare changes may result in disparate impacts or disproportionate burdens is 10%. If average fares increase 10% *more* for minority or low-income riders than for all riders as a whole it is considered a disparate/disproportionate burden, and if average fares decrease by 10% *l*ess for minority and low-income riders than for all riders it is considered a disparate/disproportionate benefit. Upon finding a potential disparate impact on minority populations from a proposed fare change, the MBTA will determine whether alternatives exist that produce less of a disparate impact but still accomplish the legitimate goal(s) of the original proposal. Upon finding a potential disproportionate burden on low-income populations from a proposed fare change, the MBTA attempts to avoid, minimize, or mitigate the impacts of the change.

Two Approaches to Improving Equity

Approaches to improving equity of Commuter Rail fares are generally either *place-based* or *people-based*. A place-based approach would set different fares for different locations based

on social equity considerations such as the share of area residents with low incomes. A people-based approach would set different fares for different people based on individual characteristics (such as income), potentially resulting in two riders at the same location paying different fares.

The following sections describe place-based and people-based options for addressing equity on MBTA Commuter Rail and evaluate whether those options are consistent or compatible with the policy principles that currently determine Commuter Rail fares.

Place-Based Approach to Improving Equity

Place-based approaches to improving equity on Commuter Rail have an intuitive appeal for their simplicity: If fares are too high for low-income populations to afford, then simply lower fares. Under the current Commuter Rail fare structure, "simply lowering fares" could take the form of either reducing the fares for specific trip types (such as the Zone 1 fare) or of re-assigning specific stations to a lower zone with lower fares (such as moving a station into Zone 1A).

As a means of improving equity, these place-based policies are blunt tools that cannot address affordability in a comprehensive way and have many unintended negative effects. Specifically with respect to Title VI equity analyses, place-based fare reductions on Commuter Rail intended to help low-income populations end up disproportionately benefiting a largely white and upper-income population of current riders (suggesting a need to consider alternatives with less disparate impacts and/or to provide offsetting benefits to low-income riders elsewhere on the system). These downsides to place-based approaches are described in the following sections.

Place-Based Commuter Rail Fare Changes Disproportionately Benefit Upper-Income and White Riders

Low-income and minority ridership varies substantially across MBTA services. Relative to other MBTA services, the Commuter Rail has a very low share of Title VI and EJ populations. As seen by the figures below, low-income riders account for only 7% of Commuter Rail ridership, and minorities account for only 15%. These percentages are smaller than every other MBTA service except ferry. Additionally, all Zone 1-10 stations have lower minority and/or low-income ridership shares than the MBTA system overall.

Lowering Commuter Rail fares for riders of all income levels (either system-wide or in certain zones or stations) would undoubtedly increase low-income ridership; however, it would benefit a large number of current upper-income Commuter Rail riders in the process, and additional upper-income people would also begin riding at lower fare rates. From a Title VI equity perspective, this unintended benefit for upper-income (and white) riders creates a disproportionate benefit that should be avoided, minimized, or mitigated (such as through other equity-enhancing fare changes). From a general policy perspective, giving up fare revenue from a large group of upper-income riders who are willing to pay a higher fare in order to benefit a much smaller group of low-income riders is inefficient, and lowering fares for Commuter Rail riders without providing any benefit to bus and subway riders would

unfairly favor one mode over the others. A more targeted approach that does not require such large revenue and equity trade-offs would be preferred.

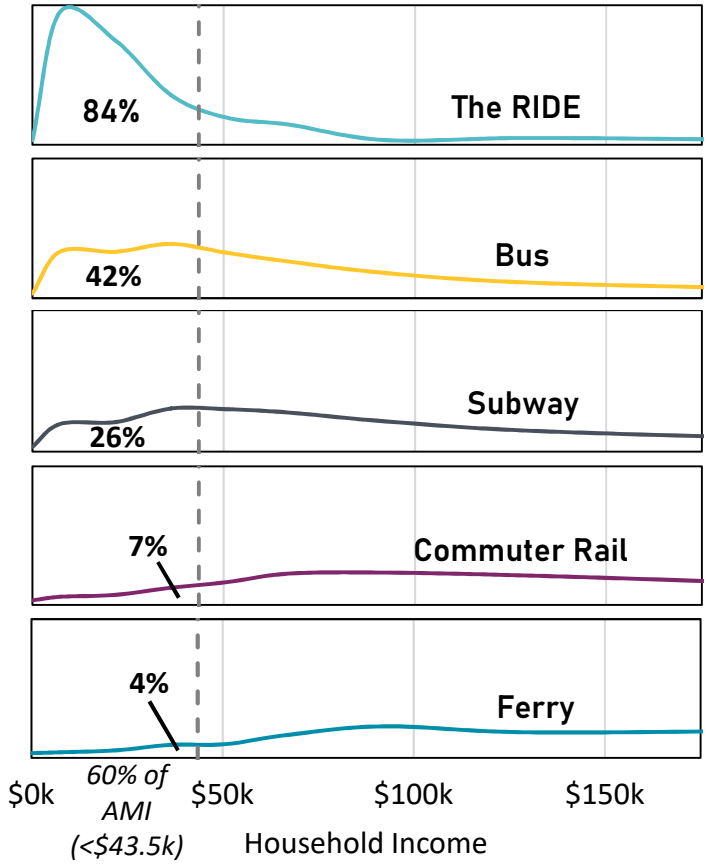
Finding: Lowering Zone 1-10 fares or moving stations into Zone 1A *in isolation* would benefit upper-income and white riders out of proportion with overall MBTA demographics, requiring the MBTA to seek alternatives and potentially mitigation (such as offsetting fare reductions on other modes).

Low-income and Minority Ridership Shares by MBTA Mode

Service	Percent Low Income	Percent Minority
The RIDE	84%	23%
Bus	42%	48%
Rapid Transit	26%	31%
Commuter Rail	7%	15%
Ferry	4%	2%
MBTA System-wide	29%	34%

Sources: MBTA Systemwide Survey, 2015-17 (https://www.ctps.org/apps/mbtasurvey2018/); The RIDE customer satisfaction survey, 2018

Approximate Income Distributions by MBTA Mode



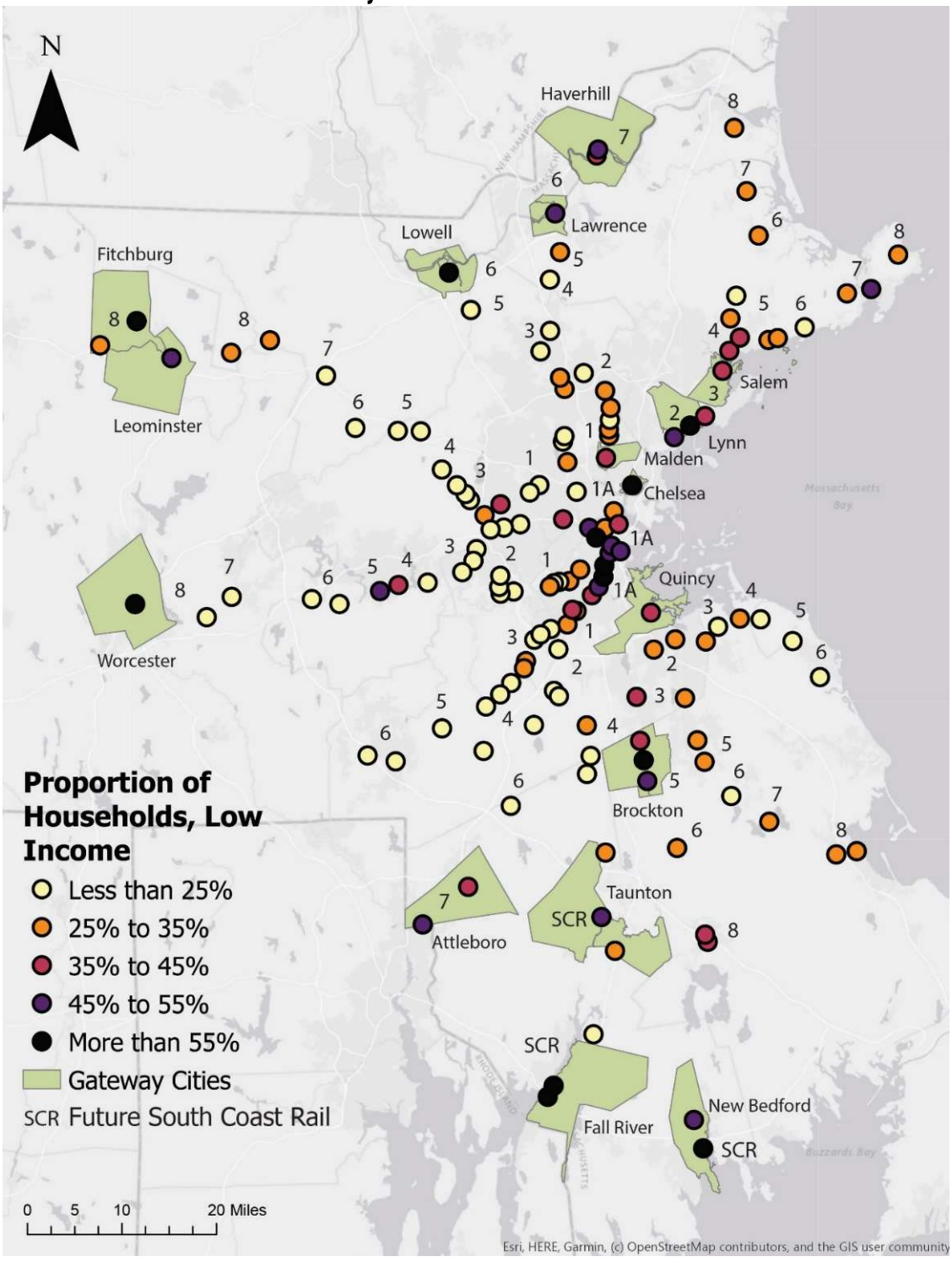
Sources: MBTA Systemwide Survey, 2015-17 (https://www.ctps.org/apps/mbtasurvey2018/); The RIDE customer satisfaction survey, 2018

Place-Based Commuter Rail Fare Changes Cannot Address Affordability Everywhere
Naturally, place-based fare changes can only improve access and affordability for low-income populations *in certain places* where fares are reduced (such as a certain zone or a set of stations). The map below shows that low-income populations are concentrated in certain areas, but those areas are throughout the region – not only downtown Boston, the Fairmount Line, and the Newburyport/Rockport Line out to Lynn, but all of the region's Gateway Cities and several other communities. Additionally, area incomes vary on a spectrum -- station areas without notable concentrations of low-income residents still have many low-income families.

A place-based approach that lowers fares at a few stations does nothing to address affordability throughout the rest of the system, and even if fares were lowered in all the Gateway Cities it would not benefit low-income families in other communities. Additionally, the geography of low-income and minority populations can change over time due to displacement and other forces; a place-based approach would set fares with reference to *current* demographics, and may be difficult to adapt over time. An approach that addresses affordability in a comprehensive and adaptable way would be preferred to a place-based approach that favors low-income populations in certain places over others.

Finding: Low-income populations are located throughout the Commuter Rail service area, so lowering fares at *select stations* cannot improve affordability system-wide.

Low-Income Households by Station Area



Sources and Notes: Household income data from 5-year American Community Survey 2013-2017. Stations are labeled with zone and colored by % low-income within ½ mile. "Low-income" in map = $50,000 or less (slightly higher than the definition of low-income in the Title VI Program: 60% of the median household income in the service area). Based on Census tracts touching ½-mile radius of each station.

Moving Stations to Lower Zones Has Many Unintended Consequences

One place-based approach to equity would move certain stations that are currently in Zones 1-10 into Zone 1A in order to provide lower fares to low-income residents of those neighborhoods. While well-intentioned, moving stations to Zone 1A to advance equity goals rather than setting zone assignments based on distance contradicts one of the basic organizing principles for the current Commuter Rail fare structure. This contradiction leads to several unintended and detrimental consequences.

1. **Fare increase for current Interzone trips.** Zone assignment affects fares for both trips to downtown Boston and outbound trips to other stations. Moving a Zone 1-10 station into Zone 1A would reduce the fare to downtown Boston (from a Zone 1-10 fare to a Zone 1A fare), but it would increases the fare for trips to other Zone 1-10 stations by 90+% (from an Interzone fare to a Zone fare). Fares for these Interzone trips are intentionally lower in order to compete with the lower cost of driving and parking between two Zone 1-10 stations, and zone reassignment removes this intentional fare discount.
2. **Park-and-ride distortion leading to increased VMT and revenue loss.** As described in the previous section, assignment of stations to either Zone 1-10 or Zone 1A is based on distance and is aligned with a general pattern of station characteristics. Zone 1A stations are ideally close to downtown Boston, in dense neighborhoods with non-driving accessibility, and have limited or expensive parking. If a Zone 1-10 station with inexpensive and available parking were assigned to Zone 1A, riders from nearby Zone 1-10 stations would be incentivized to drive and park at these stations to pay a lower fare. This results in fare revenue loss for the MBTA and an increase in VMT, contrary to revenue and environmental objectives.
3. **Knock-on re-assignment of other stations to Zone 1A.** It may be impossible to move a single station in isolation. Stations inbound from a re-assigned station would also likely move to Zone 1A to avoid a nonsensical sequence of fares along a single Commuter Rail line. This exacerbates the other effects: higher fares for Interzone trips, additional park-and-ride distortion, lost fare revenue, and increased VMT.
4. **Loss of flexibility and risk of revenue shortfall.** Zone 1A fares are currently set equal to subway fares, consistent with the competitiveness analysis presented in the last section and providing equitable access to rail service at rapid transit fares within the urban core. Moving stations into Zone 1A locks those stations into subway fares, which may be unsustainably low under the future Commuter Rail service model. This could require a later fare *increase* (partially erasing any benefit) or result in large revenue shortfalls for the MBTA in the future.

Finding: Moving stations into Zone 1A for reasons other than distance to downtown Boston creates many unintended consequences.

People-Based Approach to Improving Equity

People-based policies like means-testing are better targeted for achieving equity goals on Commuter Rail:

- By providing lower fares only to low-income populations, there is less impact on fare revenue.
- By defining eligibility for lower fares based on income rather than location, they can address affordability for low-income riders throughout the entire system.
- By not altering zone assignments (for reasons other than distance and station area type), they avoid unintended consequences for Interzone trips and park-and-ride behavior.

The MBTA is currently conducting a feasibility study of means-tested fares.

Finding: People-based policies to improve access and affordability would be more effective than place-based policies like lowering fares and changing station zones.

Addressing the Zone 1 Fare Jump

Currently, a primary rationale for differences between Commuter Rail fares is trip distance, using zone assignments. However, the jump between Zone 1A and Zone 1 fares is increasingly disproportionate to other zone increments. *Some* gap between Zone 1A and Zone 1 fares reflects a balance between basing fares on distance and other principles like competitiveness (between Commuter Rail and subway) and equity (providing subway-like fares to core neighborhoods without rapid transit service). However, the growing fare jump raises issues of fairness for nearby stations with different zone assignments, it exacerbates affordability problems for low-income riders just outside Zone 1A, and it worsens the competitiveness of Commuter Rail for Zone trips to destinations outside downtown Boston (which should be discounted from a competitiveness perspective, but do not fit cleanly in the current structure of trip types).

How can these issues arising from the Zone 1 fare jump be addressed or mitigated while maintaining a clear policy rationale for Commuter Rail fares, both now and in the future?

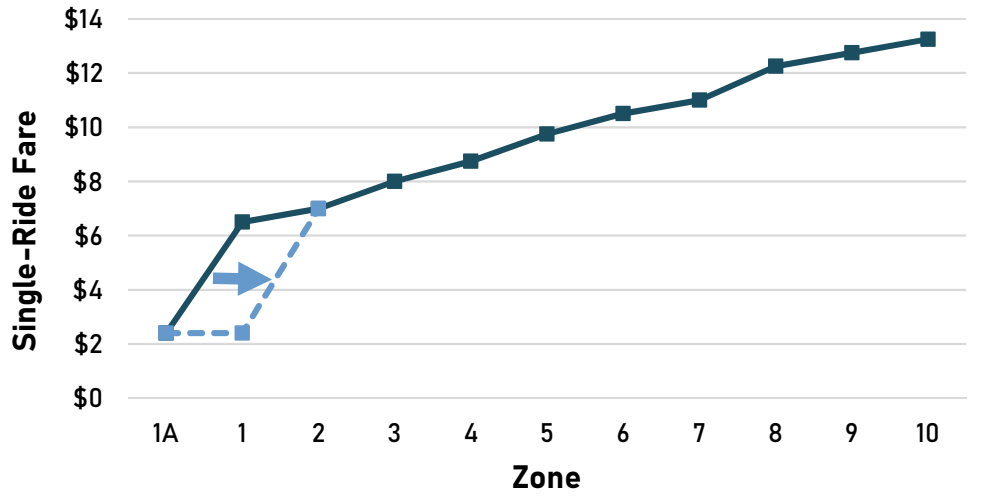
Below, we discuss two options: changing zone assignments and smoothing the fare jump. These options focus directly on the Zone 1 fare jump; note, however, that the recommendations in the previous section and the next section would both also help to mitigate the problems with the Zone 1 fare jump for populations and trip types that are adversely affected. A people-based approach to improving equity would reduce fares for low-income populations burdened by Zone fares, and reverse-peak and off-peak discounts would provide lower fares for a subset of trips that are uncompetitive in the current zone structure.

Changing Zone Assignments

One option to address the fare jump is to move Zone 1 stations into Zone 1A to avoid the fare jump.

As described in the earlier discussion on improving equity, changing zone assignments for individual stations introduces equity problems and unintended consequences. Moreover, reassignment of stations to Zone 1A merely *shifts* the fare jump to the next zone without resolving associated problems of fairness, affordability, and competitiveness. As illustrated in the chart below, if Zone 1 stations all moved to Zone 1A, the fare jump would then be between Zone 1 and Zone 2, and would be even larger.

Moving Zone 1 Stations to Zone 1A Merely Shifts the Fare Jump



Smoothing the Fare Jump

A second option is smoothing the fare jump, which maintains the distance rationale and eases the transition to potential future fare structures. The fare jump could be smoothed by a combination of:

- Raising Zone 1A fares (making the Zone 1A fare different from the subway fare)
- Lowering Zone 1 and 2 fares
- Holding Zone 1 fares while Zone 1A and Zone 2-10 fares increase over time

Raising Zone 1A fares

Inside Zone 1A, Commuter Rail plays two different roles: It provides rail service in areas not served by subway, and it provides another transit option in areas that are also served by subway.

At stations with both Commuter Rail and subway service, Zone 1A Commuter Rail fares could be raised above subway fares on the premise that Commuter Rail is the premium service option with better travel speeds. This distinction is questionable, however, since the higher frequency of subway service makes it the preferred transit alternative for many riders.

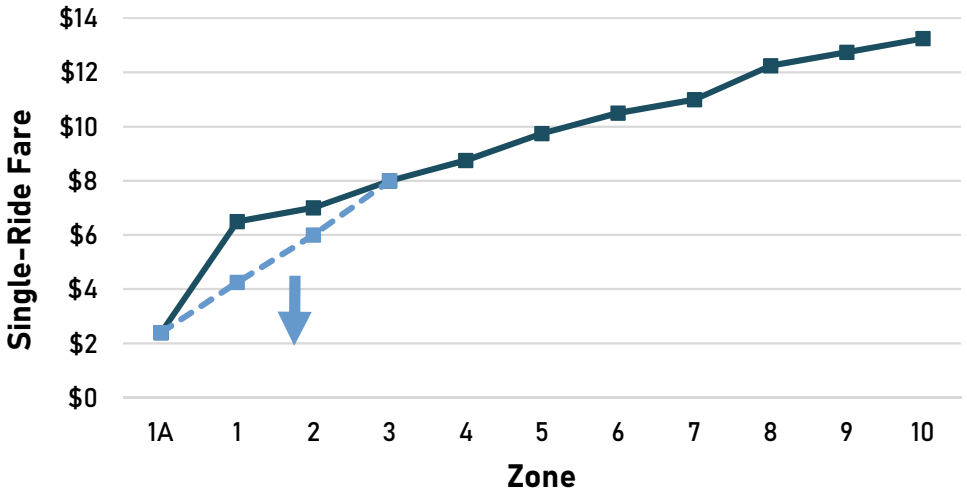
At Zone 1A stations that are not also served by subway, raising Zone 1A fares would be at odds with the goal of provide equitable access to rail service at subway fares inside the urban core. To avoid this conflict, Zone 1A fares could be raised only at stations adjacent to the subway.

Lowering Zone 1 and 2 Fares

Lowering Zone 1 and 2 fares (leaving Zone 1A fares and stations unchanged), avoids the unintended consequences caused by changing zone assignments. This option reduces the Zone 1 fare jump by moving toward flatter fares, and it avoids expanding Zone 1A or pegging

Zone 1 fares to subway fares – all of which provide desirable flexibility for fare policy as the Commuter Rail service model changes in the future.

Smoothing Zone 1 and 2 Fares Mitigates Issues with the Zone 1 Fare Jump



If the Zone 1 fare were lowered to $4.25 and the Zone 2 fare were lowered to $6.00, the estimated revenue loss would be approximately $9 million per year with a Commuter Rail ridership increase of about 200,000 rides per year (not including additional bus and subway rides from new riders and additional transfer trips).

Illustrative Ridership and Revenue Impacts of Smoothing the Fare Jump

	Fares		Ridership (thousands)		Revenue ($millions)	
	Current Zone Fare	Illustrative Zone Fare	Change	% Change	Change	% Change
Zone 1	$6.50	$4.25	+105	+5%	-$4.7	-32%
Zone 2	$7.00	$6.00	+98	+2%	-$4.4	-13%
Total Commuter Rail	N/A	N/A	+206	+0.6%	-$9.1	-3.3%

Sources and Notes: Annual estimates. Preliminary modeling based on annualized CTPS Commuter Rail Counts (2018), MBTA sales data, mTicket data, and fare elasticities from prior MBTA modeling (the FERRET fare change model). In the illustrative scenario, Zone 1 and 2 Monthly Pass prices were also lowered from $214 to $140 and from $232 to $199 (respectively), and Reduced Zone 1 and 2 fares were lowered from $3.25 to $2.10 and from $3.50 to $3 (respectively).

As with the place-based approaches to improving equity, on its own this reduction in general Zone 1 and Zone 2 fares would indicate disparities and/or disproportionalities through a Title VI equity analysis. It could only advance as part of a larger system-wide fare change that addresses these inequities; if proposed in isolation, the MBTA would be required to seek less disparate alternatives and potentially to mitigate disproportionalities.

Additionally, lowering Zone 1 fares may necessitate changes to “extension fare” policies. Extension fares allow riders to use combinations of a Zone product and an Interzone product

to complete a single trip, such as using an Interzone 5 ticket and a Zone 1 ticket to complete a trip from Zone 6 to Zone 1A. When Zone 1 fares are lowered, this combination of tickets becomes cheaper than a normal Zone 6 ticket. In order to avoid providing an unintentional discount to riders who utilize this "split ticket" strategy, extension fares would need to be increased or eliminated. (Note that the same issue would arise if Interzone fares were reduced.)

Holding Zone 1 Fares While Zone 1A and Zone 2-10 Fares Increase

A third alternative to smooth out the Zone 1A to Zone 1 fare jump is to leave Zone 1 fares unchanged as Zone 1A and Zone 2-10 fares increase over time. This is potentially a very gradual approach, since state law currently limits the rate of MBTA fare increases; however, it could be used in combination with lowering the Zone 1 fare.

This approach would reduce *potential revenue gains* from a fare change (foregoing increases in the Zone 1 fare), but it would not result in absolute reductions in fare revenue, and it is unlikely to create inequities under Title VI in the context of a broader fare change.

Finding: Smoothing the fare jump from Zone 1A to Zone 1 would counteract the growing difference in fares for adjacent stations while maintaining the principle of trip distance.

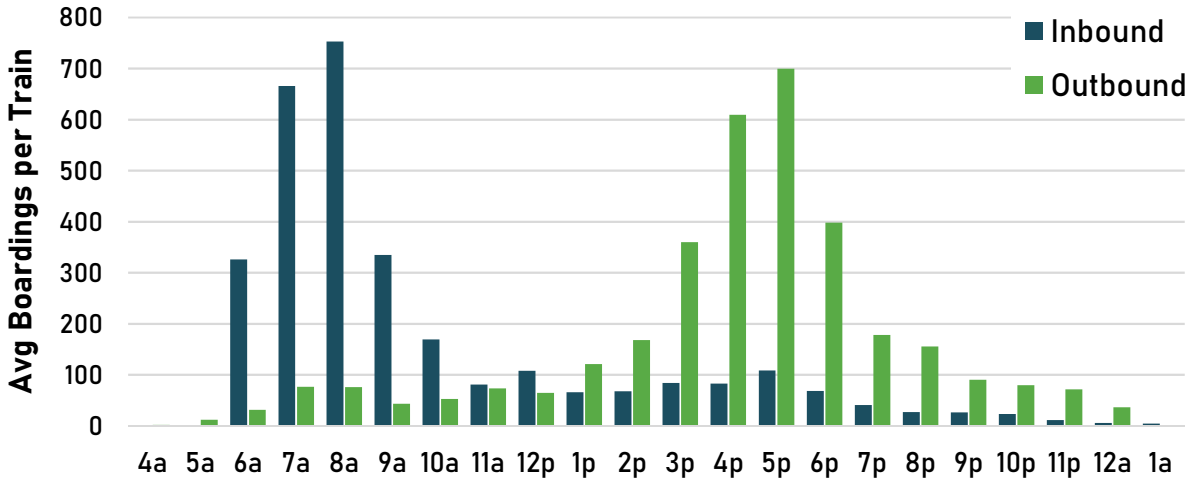
Off-Peak and Reverse-Peak Fares

Why off-peak and reverse-peak?

Lowering fares for off-peak and/or reverse-peak fares would align well with the competitiveness principle of Commuter Rail fare policy, and it presents an immediate opportunity to grow ridership before future capacity expansions.

From a capacity perspective, Commuter Rail capacity is currently constrained at peak times and directions, but there is excess capacity on off-peak and reverse-peak trains. The chart below illustrates that typical passengers per train are well below capacity for even the shortest trains during off-peak periods (mid-day and evening) and in the reverse direction during peak periods (outbound in the AM peak and inbound in the PM peak). Lower fares for travel on these trains would increase ridership at times and places with excess capacity, improving utilization. Any shifting of peak trips to later or earlier off-peak trains would additionally free some capacity on crowded peak trains.

Passengers per Train by Hour for an Average Weekday



Sources and Notes: CTPS Commuter Rail Counts (2018). Trains assigned to hours based on the time of arrival at (inbound) or departure from (outbound) the downtown terminal (North or South Station).

From a competitiveness perspective, vehicle traffic on roadways is generally lighter during off-peak times and in reverse-peak directions. For reverse-peak parking at outlying reverse-commute destinations is also less expensive than parking in the urban core. Lower fares for off-peak and reverse-peak trips would be warranted to help Commuter Rail compete with lower-cost driving, *especially* for reverse-commute travel. Reverse-commute discounts would address one of the weakness of the current zone structure that arises from non-standard station types: charging higher Zone fares for trips to destinations outside Zone 1A with inexpensive parking.

Current Reverse-Peak Pilot on Foxboro Line

Currently the MBTA is also piloting a reverse commute fare on certain trains as part of the Foxboro service pilot. This pilot allows passengers going outbound from Zone 1A in the morning peak and inbound into Zone 1A in the afternoon peak when trains have capacity to get an Interzone fare. All trips within Zone 1A still have Zone 1A fares, but a trip from Zone 1A to Zone 4 pays the Interzone 4 fare. The reverse commute fare pilot will be evaluated as part of the Foxboro service pilot.

Affected Trips and Estimated Impacts

Commuter Rail is dominated by weekday peak travel, but weekday off-peak travel accounts for about 15% of ridership and weekday reverse-peak accounts for about 5%.

Estimated Annual Commuter Rail Ridership by Time and Direction

	Rides, FY2019 (millions)	Share of Rides
Weekday Peak	24.6	75%
Weekday Off-Peak	4.9	15%
Weekday Reverse-Peak	1.7	5%
Weekend	1.6	5%
Total	32.9	100%

Sources and Notes: CTPS Commuter Rail Counts (2018) annualized and expanded using mTicket usage patterns. Peak = inbound trains arriving at North or South Station before 10am and outbound trains departing from North or South Station between 3:30 and 7pm. Off-peak = trains that depart from (outbound) or arrive at (inbound) North or South Station between 10am and 3:30pm or after 7pm. Reverse-peak = outbound trains departing from North or South Station before 10am and inbound trains arriving at North or South Station between 3:30 and 7pm.

For feasibility of implementation prior to completion of the Fare Transformation project, off-peak and reverse-commute fares could follow the same rules as the Foxboro pilot: Trips to or from Zone 1A on off-peak and reverse-peak trains would pay Interzone fares, rather than the normal Zone fare.

The equity impacts for this project are unknown, as MBTA rider demographic data for the Commuter Rail is not currently available by time period and direction of travel.

An illustrative and conservative estimate of the *short-run* ridership and revenue impacts is shown in the table below: An increase of about 1 million rides, and a fare revenue loss of about $18 million per year. There is substantial uncertainty around the ridership response to lower off-peak and reverse-peak fares; long-run ridership responses can be two to three times larger than short-run responses, which would also reduce the estimated revenue loss.

Illustrative Impacts of Lower Fares for Weekday Off-Peak and Reverse-Peak

	Fare To/From Zone 1A		Ridership (millions)		Revenue ($millions)	
	Current Fare	Illustrative Fare	Change	% Change	Change	% Change
Weekday Peak	Zone Fare	Zone Fare	0	0%	$0	0%
Weekday Off-Peak	Zone Fare	Interzone Fare	+0.8	+16%	-$14	-35%
Weekday Reverse-Peak	Zone Fare	Interzone Fare	+0.2	+14%	-$4	-35%
Weekend	Zone Fare	Zone Fare	0	0%	$0	0%
Total Commuter Rail	N/A	N/A	+1.0	+3%	-$18	-7%

Sources and Notes: Annual estimates. Preliminary modeling based on CTPS Commuter Rail Counts (2018), mTicket usage patterns, MBTA sales, MBTA Systemwide Survey 2015-17 (https://www.ctps.org/apps/mbtasurvey2018/). Short-run ridership response factor based on academic studies and prior MBTA modeling (the FERRET fare change model). Assumes some current Zone Pass holders that travel off-peak and reverse-peak will change their pass to receive the discount. No adjustment for long-run ridership response (potentially 2-3x short-run) or for additional peak rides and revenue. Peak = inbound trains arriving at North or South Station before 10am and outbound trains departing from North or South Station between 3:30 and 7pm. Off-peak = trains that depart from (outbound) or arrive at (inbound) North or South Station between 10am and 3:30pm or after 7pm. Reverse-peak = outbound trains departing from North or South Station before 10am and inbound trains arriving at North or South Station between 3:30 and 7pm.

The fare revenue implications of lowering fares for reverse-peak and especially off-peak travel could be substantial. However, given the alignment with current policy principles (especially for reverse-peak fares) and the potential to grow ridership in a way that better utilizes existing capacity, we recommend pursuing an off-peak and/or reverse-peak fare pilot to better understand the ridership impacts.

Finding: Reducing fares for off-peak and reverse-peak travel would improve competitiveness for these trips, growing ridership on underutilized trains.

Summary of Findings

This section summarizes the findings that emerged from the analysis in this study. There are four key findings, each with several supportive findings identified throughout the report.

Key Finding: Current Commuter Rail fares are generally consistent with identifiable policy principles.

Finding: There are many potential policy principles for setting fares. MBTA Commuter Rail fares are primarily organized around principles of trip distance and competitiveness (also accounting in some ways for principles of operating cost, quality of service, and access and affordability).

A rational Commuter Rail fare structure should be guided by policy principles that connect the MBTA's overall fare policy objectives with specific fare rules. Of all *potential* policy principles, these five are most clearly reflected in the current Commuter Rail fare structure:

- **Trip distance**, approximated by zones and capturing elements of both competitiveness and operating costs.
- **Competitiveness** of Commuter Rail with driving and with other transit options.
- **Operating cost**, which varies with trip distance and often aligns with competitiveness.
- **Quality of service** across transit options, including consideration for both speed and frequency of service.
- **Access and affordability** of transit, including rail service at subway-like fares within the urban center and reduced fare programs.

Finding: MBTA's zone-based fares and assignment of stations to zones are generally consistent with track distance from stations to downtown terminals.

Commuter Rail fares are not determined *purely* by track distance, instead reflecting a balance between distance and other policy principles. Per-mile fares are generally higher for shorter trips and lower for longer trips (consistent with operating cost), and per-mile fares vary widely depending on whether a trip is a Zone 1A trip, a Zone trip, or an Interzone trip (consistent with competitiveness). However, fares do increase with distance, and assignment of stations to zones is highly consistent with distance to the downtown Boston terminal station. Inconsistencies in zone assignments are limited to two Fairmount Line only stations in Zone 1A (due to lack of rapid transit service in those core Boston neighborhoods) and a few stations at the end of a line or in the same municipality as another station.

Finding: For travel from Commuter Rail stations to the downtown terminals, Commuter Rail is generally competitive with driving and parking in downtown Boston. The competitiveness of Commuter Rail with driving for any particular trip depends on many case-specific factors.

The competitiveness of any specific trip can vary widely based on factors such as access time and the priority placed on frequency and reliability. In general, though, we find that Commuter Rail travel times are similar to or better than driving from stations to downtown Boston at rush hour, and the cost of taking Commuter Rail is consistently lower than driving and parking in downtown Boston (even ignoring long-term costs of driving, like maintenance and replacement).

Key Finding: The rationality and equity of Commuter Rail fares can be improved.

Finding: Fares may be unaffordable for low-income populations throughout the system who do not have access to existing reduced fare programs.

Commuter Rail fares may be competitive with other options, but that does not ensure that fares are affordable for low-income riders. MBTA's existing reduced fare programs improve access and affordability of Commuter Rail for students, seniors, and people with disabilities. For low-income riders who do *not* qualify for these programs, current fares – especially Zone fares into or out of Zone 1A – create a barrier to access. Low-income populations are not localized in certain zones or at certain stations, but are found throughout the entire Commuter Rail system; any comprehensive strategy to improve access would need to be applied system-wide.

Finding: A large gap has developed between the Zone 1A fare and the Zone 1 fare.

A disproportionate jump has existed since at least the 1990s, but fare changes over the years have widened the fare jump substantially, from +$2.55 in 2007 to +$4.10 today. This has led to adjacent stations with a large difference in fare. Having *some* gap between Zone 1A and Zone 1 fares reflects a balance between distance-based fares and other competitiveness and equity considerations; however, the growing size of the gap strains that balance between policy principles and raises issues of fairness.

Finding: Round trips that enter or leave Zone 1A but have low parking costs or other transit options are priced too high to compete effectively with lower-cost alternatives.

The current fare structure allows the MBTA to price Zone 1A trips (inside Zone 1A) and Interzone trips (entirely outside of Zone 1A) lower than Zone trips (which enter or leave Zone

1A). This helps Zone 1A and Interzone trips to better compete with lower-cost transit and parking options, without unnecessarily impacting fare revenue from Zone trips. However, certain Zone trips face similar competition but do not currently have lower fares: reverse-commute travel from Zone 1A to stations in Zones 1-10, and trips to or from stations on the edge of Zone 1A that have less-expensive parking or are also served by bus or subway. For these types of trips, current fares limit ridership and lead to inefficient travel on slower, but cheaper transit alternatives.

Key Finding: Lowering fares for Zone 1-10 trips or moving stations into Zone 1A creates equity problems and other unintended consequences.

Finding: Low-income populations are located throughout the Commuter Rail service area, so lowering fares at *select stations* cannot improve affordability system-wide.

Low-income populations are not localized in certain zones or at certain stations, but are found throughout the entire Commuter Rail system. Lowering fares or changing station zone assignments would only benefit low-income riders in these locales without improving access and affordability for other low-income populations.

Finding: Lowering Zone 1-10 fares or moving stations into Zone 1A *in isolation* would benefit upper-income and white riders out of proportion with overall MBTA demographics, requiring the MBTA to seek alternatives and potentially mitigation (such as offsetting fare reductions on other modes).

Under Title VI, the MBTA must perform *system-wide* evaluations to determine whether fare changes disproportionately favor upper-income and/or disparately favor non-minority riders. An estimated 29% of MBTA rides *across all modes* are low-income, and 34% are minority. The shares for current Commuter Rail rides are much lower: 7% low-income and 15% minority. As a result, lowering Commuter Rail fares in isolation – either directly or by moving stations between zones – would *disproportionately benefit* upper-income riders at every Zone 1 to 10 station, and lower fares would also *disparately benefit* white riders at nearly all the same stations. (Lowering Commuter Rail fares would of course benefit *some* low-income and minority riders; however, it would also benefit many upper-income and white riders in the process.)

These two inequities would need to be addressed under Title VI. To address the finding of a *disproportionate benefit for upper-income populations*, the MBTA should avoid, minimize, or mitigate the impacts, where practicable. This could include expanding the proposed change to include other fare changes that improve equity (such as reductions in bus and subway fares) or compensatory spending on other equity-enhancing measures. If the MBTA wished to advance a fare proposal that still created a *disparate benefit for white riders*, the MBTA would be required to provide a substantial legitimate justification for the proposed change – a legitimate program goal – and to show there are no alternatives to achieve the same goal

that would have a less disparate impact on minority riders. If alternatives exist, a transit provider is expected to implement the least discriminatory alternative.

Finding: Moving stations into Zone 1A for reasons other than distance to downtown Boston creates many unintended consequences.

The rationality of the current Commuter Rail fare structure depends on stations being assigned to zones based on distance to downtown Boston. Moving stations into Zone 1A out of a desire to lower fares for local residents would contradict this distance principle and lead to many unintended consequences and risks: significantly increased fares for current Interzone trips, revenue loss and increased VMT from riders driving to Zone 1A stations with low-cost parking, a domino effect leading to re-zoning other stations, and the risk of locking the MBTA into fares that are unsustainably low under potential future service models.

Key Finding: Lowering fares in targeted and moderated ways has the potential to address issues without some of these consequences.

Finding: People-based policies to improve access and affordability would be more effective than place-based policies like lowering fares and changing station zones.

Policies that provide lower fares to people based on individual or family income could benefit low-income riders throughout the *entire* system (not only in certain places), avoid inequitable benefits to upper-income riders and associated impacts on MBTA revenue, and avoid the unintended consequences of changing station zones.

Finding: Smoothing the fare jump from Zone 1A to Zone 1 would counteract the growing difference in fares for adjacent stations while maintaining the principle of trip distance.

In contrast to moving Zone 1 stations into Zone 1A, intentionally smoothing the fare jump from Zone 1A out through Zone 2 or Zone 3 would make the use of distance to determine fare differences more consistent, and it would likely improve perceived fairness. There are several options to achieve this smoothing over time. The nearest-term option, reducing Zone 1 fares to $4.25 and Zone 2 fares to $6, would lead to an estimated gain of about 200,000 rides per year and an estimated revenue loss of $9.1 million per year; however, like all reductions in Zone 1-10 fares, an equity analysis of this change *on its own* (apart from a broader fare proposal) would result in a Title VI finding of a disproportionate benefit for upper-income riders and a disparate benefit for white riders.

Finding: Reducing fares for off-peak and reverse-peak travel would improve competitiveness for these trips, growing ridership on underutilized trains.

It is generally less expensive to drive out of Boston and park (reverse-commute travel) than to drive into Boston and park downtown. The same is true to a lesser extent for driving into Boston during off-peak periods. However, the Commuter Rail fare for all of these trips is currently the same: a Zone fare into or out of Zone 1A. Lowering fares for reverse-commute travel (outbound in the AM rush and inbound in the PM rush) and off-peak travel (midday and evening) could improve the competitiveness of Commuter Rail with the lower cost of driving for these trips. The MBTA has significant excess capacity on reverse-peak and off-peak trains to absorb increased ridership. Charging Interzone fares for reverse-peak and off-peak travel could increase ridership by 1 million trips or more annually, but may reduce fare revenue by up to $18 million per year by providing discounts to current reverse-peak and off-peak riders (about 5% and 15% of total ridership, respectively).

Recommendations

Based on the findings summarized in the previous section, we make three recommendations for improving the rationality and equity of Commuter Rail fares while maintaining consistency with the current policy principles for fares.

Recommendation: Complete the ongoing feasibility study of means-tested fares.

Low-income riders who do not qualify for existing reduced fare programs may be unable to afford Commuter Rail fares — especially Zone 1-10 fares. While a place-based policy like lowering fares in Zone 1 or moving certain stations into Zone 1A would help low-income populations *in those locales*, it would not improve access for low-income families elsewhere in the Commuter Rail network, it would disproportionately benefit existing upper-income riders and disparately benefit existing white riders, and it would have other unintended consequences. People-based approaches to improving equity, like means-testing, can avoid these pitfalls and more effectively improve access by targeting low-income populations throughout the entire region.

Recommendation: Smooth the current jump between the Zone 1A fare and the Zone 1 fare.

This fare jump has grown much larger since 2007, and the large gap between fares at adjacent stations strains the geographic equity of the fare system and diminishes the consistency of the principle that fares are based on distance. The fare gap could be reduced in several ways, which have different implications for fare revenue and fare equity:

1) *Zone 1 (and Zone 2) fares could be lowered*. On its own, this change would reduce fare revenue, and it would result in a disparate benefit to white riders and a disproportionate benefit to upper-income riders – requiring the MBTA to analyze less discriminatory alternatives and to consider mitigation measures, such as packaging with fare equity improvements. However, if such a change were incorporated into an upcoming fare change, the MBTA would have the opportunity to make fare adjustments across media and modes to address these possible disparities and ultimately improve fare equity system-wide.
2) *Zone 1 fares could be held constant while Zone 1A and Zone 2-10 fares increase*. This is a very gradual approach absent changes to state law limiting the size of fare increases. It would reduce potential revenue gains from a fare change (foregoing increases in the Zone 1 fare), but it is unlikely to create inequities under Title VI in the context of a broader fare change.

Recommendation: Develop a pilot proposal for reverse-commute and off-peak fares.

Lowering fares for these trip types (especially reverse-commute) would be consistent with competitiveness as an organizing principle for Commuter Rail fares, since these trips currently charge Zone fares but must compete with a lower cost of driving and parking. Reverse-commute and off-peak fares have the potential to grow ridership before future capacity expansions by providing discounts at times and places with significant excess capacity; however, the ridership benefits and revenue impacts are uncertain. A pilot on certain lines, potentially in connection with mitigation for service disruptions or other pilot initiatives, could be used to evaluate the feasibility and impacts before considering adoption across the entire Commuter Rail system.

Future Considerations

This study identifies the primary policy principles that are reflected by the current fare structure and presents several opportunities to make improvements consistent with those guiding principles.

Our recommendations can be implemented either before or during the next MBTA fare increase. (By resolution of the Fiscal and Management Control Board, the next time the MBTA will consider increasing fares is July 2022.) In order to provide an indication of the potential ridership and fare revenue impacts of recommended changes, we analyzed illustrative scenarios with specific assumptions. Impact estimates should be updated and refined for any specific proposal by the MBTA before full adoption. (Revenue impacts of means-tested fares are being estimated as part of the MBTA's means-testing feasibility study.)

This study identifies other potential policy principles and ongoing processes expected to result in major changes in the Commuter Rail service model and fare collection system; however, we do not provide a full analysis of these changes or long-term recommendations. As part of the Fare Transformation project, Commuter Rail is expected to integrate with the broader automated fare collection system around 2024. The timeframe for any service pilots or initial phases of implementation related to the Rail Transformation effort, following the completion of Rail Vision, is currently in development.

These projects will provide future opportunities for broader conversations about *alternative* policy principles for Commuter Rail or more significant changes to Commuter Rail fares, such as new transfer policies and restructuring of fare zones. Any such new principles for Commuter Rail fares deserve public input and discussion with proper context about the service characteristics, operating costs, and revenue impacts of Commuter Rail in the future. We hope this study will provide a foundation to inform those discussions in the coming years.

This page was left intentionally blank